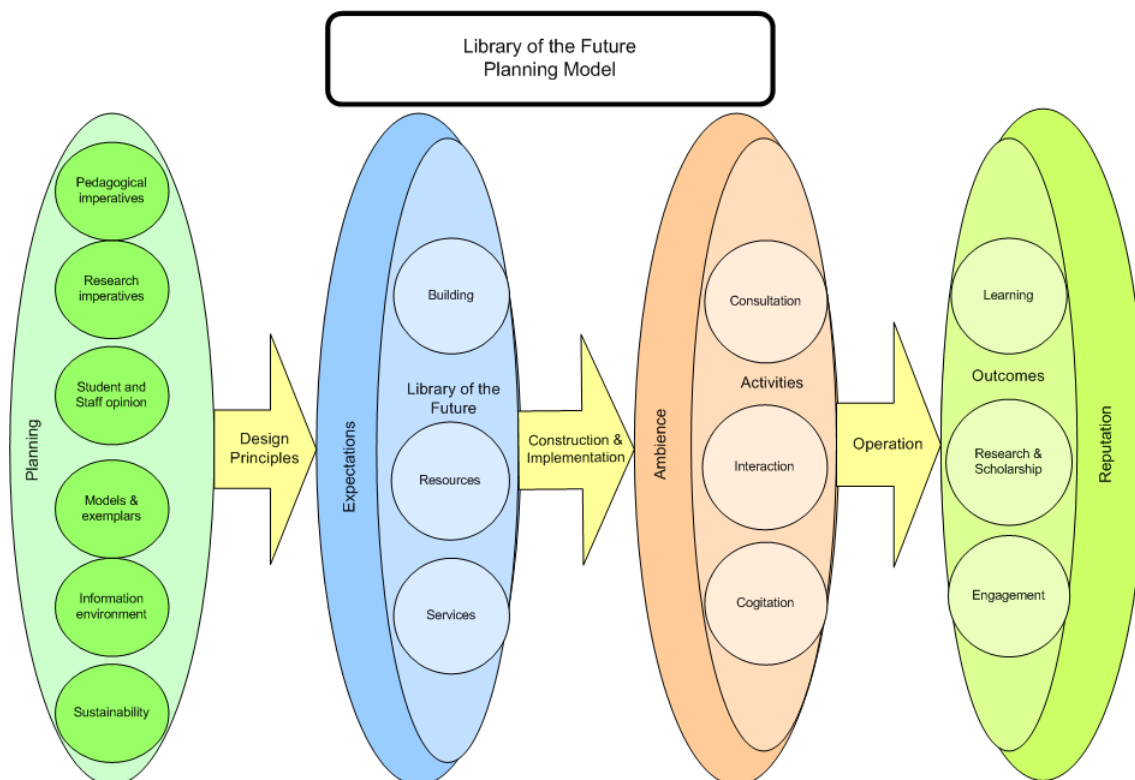


University of Technology, Sydney  
University Library

## Designing the Library of the Future



Alex Byrne  
March 2010

"All institutions of higher learning have a place called the library ... A great deal of money, time, and effort have been poured into the library. Because of an aura of mistaken veneration and misplaced emphasis, however, its potential for education has been largely neglected and its potential for providing the environment for an effective community has been overlooked."

- Taylor, Robert S, 1972, *The making of a library: the academic library in transition*, New York, Becker and Hayes, p.1.

# Contents

Executive Summary	1
1 Introduction	5
2 Planning	15
2.1 Information environment	20
2.2 The Sustainable Collection Model	24
2.3 Pedagogical imperatives	29
2.4 Research imperatives	34
2.5 Sustainability	47
2.6 Student and staff opinion	50
2.7 Models & exemplars	53
3 Activities & Outcomes	61
3.1 Learning	62
3.2 Research & Scholarship	63
3.3 Engagement	64
4 Design principles	67
4.1 Building	70
4.2 Resources	71
4.3 Services	71
5 Conclusion	73
References	75
Appendix A Libraries visited during development leave	81
Appendix B Other sites of interest visited	95
Appendix C Other sites mentioned in the report	99





## Executive Summary

### Creating the Library of the Future at UTS

The University of Technology, Sydney (UTS) has embarked on a major redevelopment of its City Campus. A key element of this redevelopment is the planned construction of a new University Library at the centre of the redeveloped campus on the current site of Building 2, adjoining the UTS Tower, Building 1. This [Library of the Future](#), which is planned to open for academic year 2015, will be a new kind of academic library which will aim to set a standard for the future.

The focus of this report is on envisaging a Library of the Future, what it might be when it opens and how it might develop to retain its novelty so that it will continue to surprise and excite. To endeavour to imagine and create a Library of the Future is a daring and humbling enterprise: it must be designed to foster an effective academic community in the long term at UTS through its role as the knowledge hub of the University.

Of course, this paper is not a brief for the architects who will design the building to house the new UTS Library. It is, rather, a research paper which seeks to summarise trends and issues which will inform the brief for the architects. Those trends and issues must be set in the context of the nature of UTS, its courses, its students and its strategic priorities – and how they are expected to develop into the future, well beyond the opening of the new Library.

### Sustainable Collection Model

The Library of the Future, will embrace both digital and physical realms to support learning, scholarship and research in new ways. Informed by the past, it will be free of many of the constraints of earlier models and prepared to take up the challenges of the future. Central to its conceptualisation is a new [Sustainable Collection Model](#) which recognises that contemporary and future provision of information to support learning and research by academic libraries will be layered, extending from high demand, high use materials to the wealth of resources available via the Internet and through other libraries.

The [Sustainable Collection Model](#) provides the intellectual justification for the decision to install an Automated Library Retrieval System. The System will permit the open access collection in the new library building to be limited to 250,000 volumes – plus digital resources – with the remainder of the physical collection located in an underground store. The decision to install an Automated Library Retrieval System has made it possible to locate the Library of the Future at the core of the redeveloped campus in a smaller building than would be required for conventional academic libraries, including those modern examples which include dense storage of journals and other publications. This will achieve tremendous savings in capital cost and, when coupled with the implementation of Radio Frequency Identification (RFID) technology for locatability and security, will deliver major service enhancements and significant operational efficiencies.

## A new kind of academic library

The information environment has changed radically so the assumptions about the role and, hence, design of academic and research libraries must all be reconsidered. UTS's Library of the Future will: be located in the broad information universe; take advantage of contemporary and future technologies to maximise efficiency and effectiveness; build and exploit expertise; respond to the changing needs of its clientele and recognise that they use a variety of sources for information and knowledge; and be actively promoted within and beyond the University.

The Library of the Future will be a place of learning, in all the senses of that word, for the twenty-first century. It will be a place in which the students and scholars of the twenty-first century can navigate the rapidly increasing volumes of digital scholarly information while continuing to take advantage of the scholarship recorded in the past and that which is still being published in tangible formats. Thus, [the key question to be addressed in designing the Library of the Future is how to bring together these digital and physical spaces into a coherent whole.](#)

The digital spaces are the constructs which we create mentally when we use digital equipment and services, find and use digital information and data, and communicate. They include the digital space that a student uses when consulting an ebook online, copying or annotating some content, preparing a report, seeking feedback from another student, sharing with yet another working on a group project, listening to a downloaded music track, checking a timetable and looking at an online map to find where to meet for dinner. All of these activities have physical analogues but they are inadequately described in physical terms, they operate within real spaces, digital spaces.

Not that the physical spaces have decreased in importance. They remain essential for the consultation of books and other tangible materials and for quiet concentrated thought and composition – the archetypal silent reading rooms. But, increasingly, libraries need to provide spaces for [interaction](#) in which students can work together on projects in accordance with contemporary modes of learning and can secure places for social learning, learning conducted in the society of others especially friends and peers. These are not the silent reading rooms of tradition but vary from places with periodic quiet conversational murmur to vibrant, active and noisy learning spaces.

UTS is committed to community engagement and rendering the campus more 'porous' is an important aim of the campus redevelopment program. This is an important aim for the Library of the Future but it raises a key question – [to what extent can and should the University Library be open to the public?](#) – and the need for a nuanced way of regulating access while attracting and welcoming current or potential partners to a cultural site which should be open to interested members of the public to exhibit the creativity of UTS and its partners.

Five principles summarise the characteristics of the Library of the Future and, to an increasing degree, differentiate it from previous models:

**Sustainability** – The Library of the Future must be sustainable in the triple bottom line understanding of that term.

**Openness** – The three major aspects of openness are open access to knowledge through unrestricted access to scholarly information, support for open interaction and discourse, and provision of an environment which all can enter and find secure.

**Interaction** – Interaction is the counterpart to consultation and cogitation and the key to engagement; it lies at the heart of the conception of the Library of the Future and is a major point of differentiation from previous library models.

**Learning** – The academic library of the future will be a place in which researchers and students encounter knowledge, study and discourse to develop their own understanding and create new knowledge.

**Scholarship** – The Library of the Future will take the library beyond being a place of encounter with knowledge to becoming a place of engagement with knowledge through its active support for research and research education.

## The opportunity

The Library of the Future project offers UTS a tremendous opportunity to reinvent the academic library for the benefit of current and future students, teachers and researchers at UTS and to stimulate thinking about libraries into the Twenty-first Century.

The strong history of innovation and reinvention of scholarly library and information services by UTS:Library provides a solid foundation for further ‘pushing the envelope’ to imagine the Library of the Future and bring it into being by 2015. Planning for that Library will emerge from a consideration of the trends and issues summarised in this report against the current and future characteristics of UTS, its community and its academic programs and research emphases.

In some respects, that Library will – and must – be familiar as it continues to support current modes of study and research. But it will be different in its orientation and capacity to evolve to facilitate and enhance future approaches. It will not be unique in seeking to define the future but it will be on the leading edge of those developments. This report confirms that UTS has the wherewithal and capabilities to take that position of leadership.



# 1 Introduction

Robert S Taylor (1972), quoted on the inside cover of this report, challenged universities and their libraries to realise the potential of the library to provide the environment for an effective academic community. Writing nearly four decades ago, he emphasised the need to bring users and information together and, at a pragmatic level, recommended the inclusion of such elements as the university bookshop, art gallery and ubiquitous online access across campus. He foresaw the day that is now upon us when academic libraries would no longer need to focus primarily on managing collections of printed books and journals and their use.

UTS has the opportunity to respond to Taylor's challenge by developing a Library of the Future which will foster an effective twenty-first century academic community at the University. It has the combination of location, creativity and technological capability coupled with the experience to realise this vision if it is prepared to be bold.

## Purpose of this report

This report considers the background and context in and for which the Library of the Future is being designed. It analyses the current and foreseeable challenges and opportunities and aims to identify the design principles that will shape the new building and the services and resources that it will house to position the new library for current relevance and future adaptability.

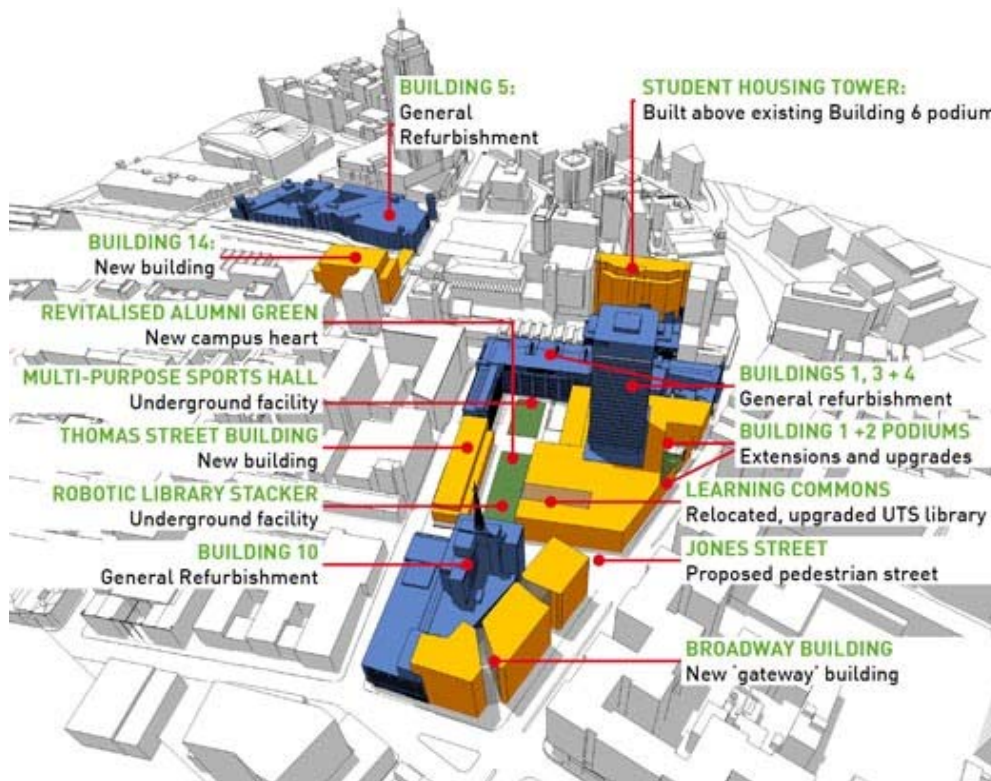
*UTS has the opportunity to develop a Library of the Future which will foster an effective twenty-first century academic community at the University.*

Although informed by the extensive literature on the design of academic libraries, the report focuses on the future and the shape that academic libraries need to take in the future rather than recreating models of the past. This is not, of course, to deny that there are practical considerations to be applied to such issues as floor loadings, accessibility for the disabled, lighting, acoustics, etc as well as the specific requirements of the UTS Building Guidelines. Those considerations will be introduced into the planning when the Accommodation Schedule is developed and will ensure that the new library building will meet all practical and regulatory requirements. Nevertheless, some mention of aspects of design which will be particularly important to the realisation of the Library of the Future are mentioned.

The focus of this report, thus, is on envisaging a Library of the Future, what it might be when it opens and how it might develop to retain its novelty so that it will continue to surprise and excite long into the future for which it is planned. To endeavour to imagine and create a Library of the Future is a daring and humbling enterprise because the future is already upon us and whatever we project will be wrong in some details at least. We dream of *futures*, build for them but also instil flexibility so that our Library of the Future will maintain its future for the students and researchers to come. It will be designed to foster an effective academic community in the long term at UTS through its role as the *knowledge hub* of the University.

## Background

The University of Technology, Sydney (UTS) has embarked on a major redevelopment of its City Campus which extends from the historic Blackfriars site on Broadway to a central complex of academic buildings on Broadway between Wattle and Harris Streets and to a complex of buildings along Quay Street and Ultimo Road in the Haymarket (see Figure 1).



**Figure 1** UTS Campus Redevelopment Masterplan

A key element of this redevelopment is the planned construction of a new University Library at the centre of the redeveloped campus on the current site of Building 2, adjoining the UTS Tower, Building 1. This [Library of the Future](#), which is planned to open for academic year 2015, will be a new kind of academic library which will aim to set a standard for the future.

## The Library of the Future

The Library of the Future will embrace both digital and physical realms to support learning, scholarship and research in new ways. Informed by the past, it will be free of many of the constraints of earlier models and prepared to take up the challenges of the future.

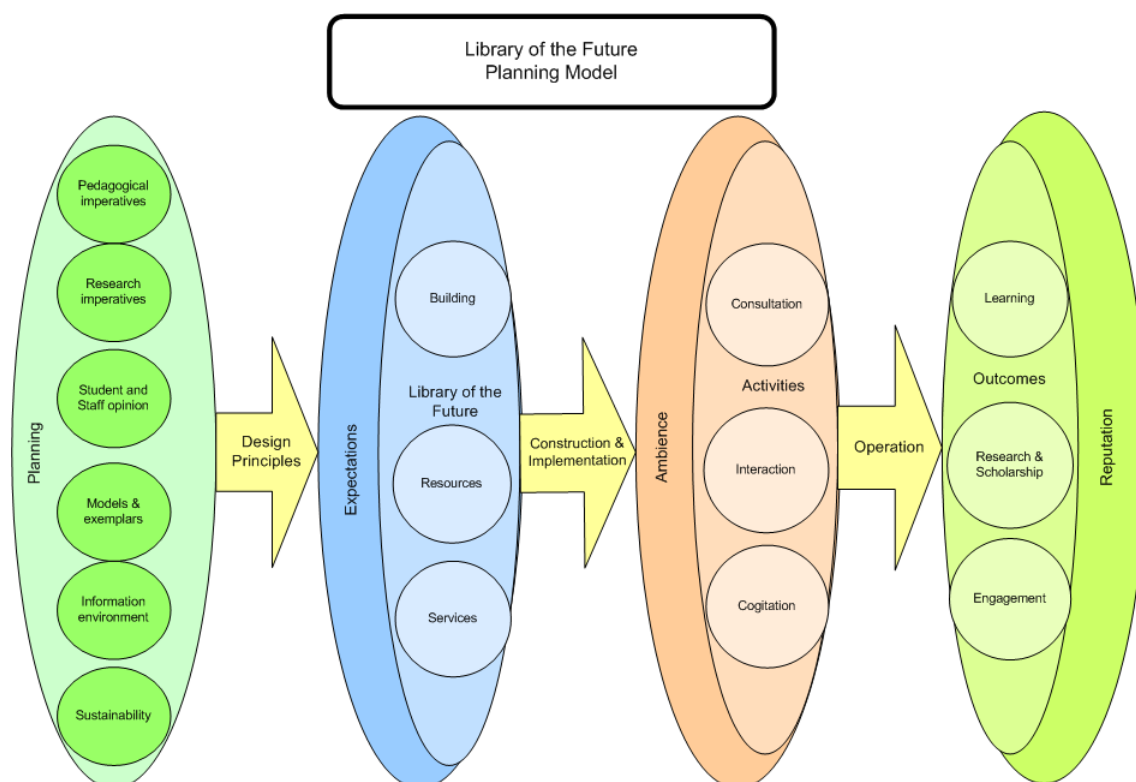
Central to the conceptualisation of the Library of the Future is a new collection model which recognises that contemporary provision of information to support learning and research by academic libraries is layered. It extends from the high demand, high use materials required for intensive usage by large classes to the other materials that need to be available for ready consultation and use and then to the foundation research and learning materials which are essential to the understanding of a field or topic but which receive less usage. All these layers are set against the wealth of resources available via the Internet and through other libraries. This [Sustainable](#)

**Collection Model** is discussed further in section 2.3, Information environment, but it is important to sketch it here because the model provides the intellectual justification for the decision to install an Automated Library Retrieval System. The System will permit the open access study and research collection in the new library building to be limited to 250,000 volumes – plus digital resources – with the remainder of the physical collection located in an underground store.

The decision to install an Automated Library Retrieval System has made it possible to locate the Library of the Future at the core of the redeveloped campus in a smaller building than would be required for conventional academic libraries, including those modern examples which include dense storage of journals and other publications. This will achieve tremendous savings in capital cost and, when coupled with the implementation of Radio Frequency Identification (RFID) technology for locatability and security, will deliver major service enhancements and significant operational efficiencies.

To create the new library, it is intended to demolish all of Building 2 except floors and columns above level 2 with the existing Engineering laboratories retained on the lower levels. The structure will then be extended to the Broadway frontage of the site and above the terrace at the opposite side. The interior will be reconstructed retaining the current atrium and reconfigured as an extensive learning commons which will integrate with the areas in Building 1 and with student centred services current located principally in Building 1.

## Planning Model



**Figure 2 Library of the Future Planning Model**

To assist the conceptualisation and delivery of the Library of the Future, the University Library has adopted the planning model depicted schematically in Figure 2. The model frames the background



and context in and for which the Library of the Future is being designed. By considering the research and pedagogical imperatives of contemporary higher education, the rapidly changing information environment, the need to achieve triple bottom line sustainability, and the views of current students and academic staff, it aims to identify the parameters which will position the new library for current relevance and future adaptability. That is, it aims to ensure that the investment will provide, for the long term, the ambience and environment to enable activities conducive to learning, research and scholarship. These considerations, extended and elaborated by drawing on examples from many domains will inform the identification of principles to guide the design of the new building and the configuration of services and resources.

## Then and Now

Projects to build 'the Library of the Future' are, of course, not new. Doubtless, the constructors of the Great Library of Alexandria had such aspirations and certainly many libraries since then have been so labelled when planned and built (Lerner 1999). In the millennial atmosphere of the late twentieth century such aspirations were common and the literature on 'libraries of the future' is vast (see, for example: Shuman 1989; Kusnerz 1989; Steinke 1992; Lancaster 1993; Drabenstott 1993; Geleijnse & Grootaers 1994; Bloch & Hesse 1995; Shuman 1997; Graubard & LeClerc 1998; Harris 1998; Earnshaw & Vince 2008).

One explicit example is the University Library at the University of Bath, UK. Claimed to be "building for the twenty-first century", it aims to integrate the delivery of information technology and multi-media information services with the more traditional library services of books, reading and study space. The Structural Steel Design Award Scheme for 1997 was given for 'an elegant conception solution had been worked out with technical innovation and flair'. It is described as:

"A new learning centre was created at the front of the Library, and at the same time the whole of the former building was refurbished. With over a thousand seats, including 450 computer workstations, it was purpose designed for 24 hour opening. The University's 500,000 volumes of books and periodicals are, in this library for the future, provided within an environment conducive to the growth of self-directed learning and group work. The facility is intended to encourage the development of IT skills and computer assisted learning, whilst maintaining the social role of the library at the academic heart of the University. The University of Bath has a proud reputation of providing graduands with skills for the modern world of management and industry; its mission is to advance learning and knowledge by teaching and research, particularly in science and technology, in close association with industry and commerce. The opening of the new Library is a manifestation of its commitment to this mission." (<http://www.bath.ac.uk/library/about/building.html> )

But we must be cautious in making such claims. For, when we now look at many of the libraries constructed as 'libraries of the future' only a decade or two ago, they usually appear to be exemplars of a past age (see, for example, the 1980s University Library of the University of Lausanne in Figure 3).





**Figure 3**      **A 'library of the future' designed 30 years ago: the University Library of the University of Lausanne**

While it is sobering to recognise the rapid obsolescence of library buildings that had been planned with great care, this recognition is not surprising because we are on the cusp of a revolution in the distribution, storage and use of knowledge and information in all spheres including the scholarly resources in which academic libraries deal. As is elaborated in section 2.1, the information environment has changed radically so the assumptions about the role and, hence, design of academic and research libraries must all be reconsidered. We recognise that the truths of the pre-Web environment must be questioned in the current Web 2.0 context and in looking beyond to further developments. As Delambre (2004) has noted, libraries must be reconceptualised beyond buildings: “the Library is the Message”.

Nevertheless, libraries and their buildings are not doomed to obsolescence. Both have continued to evolve to meet the changing needs of society through their long history. Writing nearly a century ago, Charles C Williamson of the New York Public Library predicted eight changes for the period immediately following the First World War, many of which remain relevant with little need for translation into today’s terminology (Sagg 2002 p.xvi):

1. Transportation and communication will constantly improve, which means, among other things, that less and less reason will exist for even a fairly large library trying to hold in their own local collections all the books that are to be used in the community at any given time.
2. All branches of the public service must increase in efficiency, because the public will demand a full return for the expenditure of public money.
3. Everybody will be trained for his work.

4. Specialization of function will receive still more emphasis, giving the benefits of division of labor and requiring a more scientific organization.
5. All processes that can be reduced to routine will take advantages of the economies of large-scale operations.
6. Illiteracy will practically disappear while working hours grow shorter, and a larger proportion of the population will demand an opportunity to make practical use of their ability to read.
7. New methods of instruction and new avenues of recreation and culture will arise, some requiring the cooperation of the library, others competing with it. The library must be flexible in spirit and organization.
8. We shall know more about the formation and control of public opinion in a democracy.

His maxims guide our development of UTS's Library of the Future. It will: be located in the broad information universe; take advantage of contemporary and future technologies and maximise efficiency and effectiveness; build and exploit expertise; respond to the changing needs of its clientele and recognise that they use a variety of sources for information and knowledge; and be actively promoted within and beyond the University.

However, we have also to recognise that we are in the midst of changes which are at least as profound but much more rapid and ubiquitous than those experienced in northern Europe and North America a century ago. The World Wide Web and mobile technologies have dramatically increased the pace of change and have taken it into almost all layers of people's lives, especially in developed nations but, increasingly, in almost all.

The principal characteristic of those changes is the vastly increased availability of information and data of all types: public, private, scholarly, informative, manipulative, enlightening, confusing... This radical and rapid change renders the project to construct a Library of the Future at this time very exciting and challenging. Although the project is circumscribed in that it will create an academic Library of the Future, the new university library will be a library to serve a community of 35,000 or more individuals – the size of a large town – and it will seek to engage the broader community of central Sydney. It thus has dimensions of a public library, and certainly a public space, as well as being focussed on the core questions of discovery and use of scholarly information which are the central business of academic libraries.

The explosion in the availability of data and information has been enabled by digital technologies so most is presented digitally and the very rapid growth is digital. But there remains a legacy of some 160 million distinct books<sup>1</sup> plus huge numbers of periodicals, manuscripts, maps and other media in the world's libraries, many of which are invaluable to scholars. So the Library of the Future will deal with both digital and tangible content.

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<sup>1</sup> Estimate by Google Book Search, 2009.

## Digital and physical spaces

And it will also deal with digital and physical spaces. The digital spaces are the constructs which we create mentally when we use digital equipment and services, find and use digital information and data, and communicate.

Those digital spaces include the virtual environments in which we communicate with others as I did a few minutes ago with a cousin in London, responding asynchronously to an email I had read on my smart phone by leaving a voicemail message with her mobile telephony provider and then receiving an acknowledgement via a text message. I may not be able to describe that communicative space very clearly but it is real to me and to all who use these technologies. When using them, we find ourselves – or place ourselves – simultaneously in both physical and digital spaces. Both are real, as Rettie (2005) has argued. Drawing on the work of Goffman (1974), Gibson (1979) and Merleau-Ponty (1962) in diverse disciplines, Rettie has provided an initial theoretical framework for considering the simultaneity experienced when using mobile telephones, noting that the action and interaction create a sense of embodiment and the experience of presence.

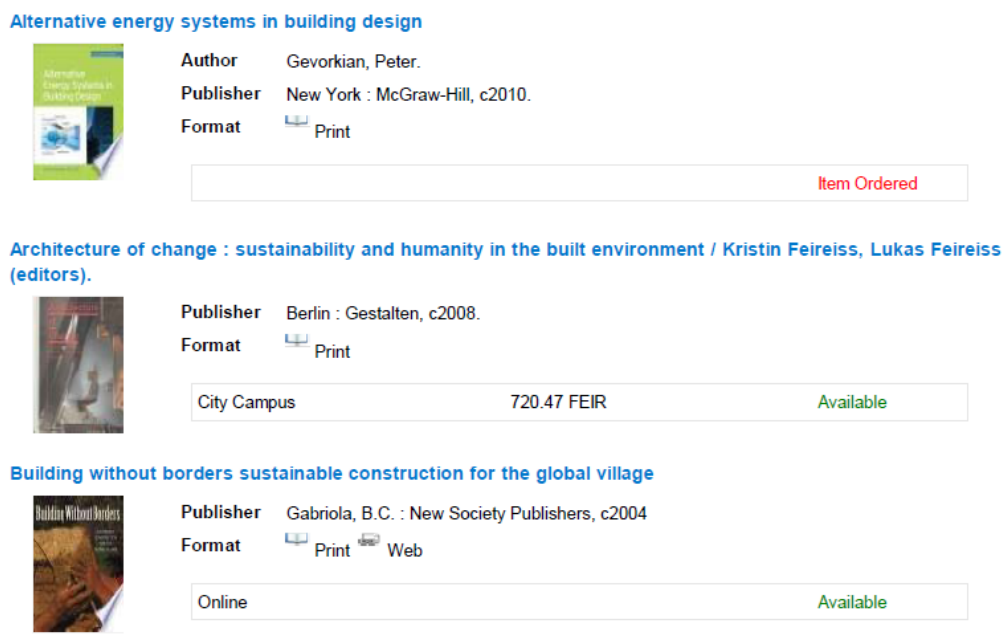
Even more faceted is the digital space that a student uses when consulting an ebook online, copying or annotating content, preparing a report or presentation, seeking feedback from another student, sharing with yet another project group member, listening to a music MP3, checking a timetable, flicking to social media and checking an online map for a dinner location. All of these activities have physical analogues but they are inadequately described in physical terms, they operate within real spaces, digital spaces. Sometimes misleadingly labelled 'virtual spaces', these spaces are real, not virtual in the sense of imaginary. Those who visit, use and dwell in them perceive them to be real and quite differently from spaces that are only imagined (Baños et al 2005).

Not that the physical spaces have decreased in importance. They remain essential for the consultation of books and other tangible materials and for quiet concentrated thought and composition – the archetypal silent reading rooms. But, increasingly, libraries need to provide spaces for interaction to enable learning in the broadest contemporary sense – via teacher directed group and individual projects but also through social learning.

Social learning is learning conducted in the society of others especially friends and peers who may or may not be studying similar topics. When asked, students say that they concentrate better when surrounded by others who are also studying and whom they can ask for advice when needed. These are not the silent reading rooms of tradition but vary from places with periodic quiet conversational murmur to vibrant, active – and, yes, noisy – learning spaces.

The students (and researchers) in these physical spaces may well be using a laptop computer, smart phone or other mobile device to find information, take notes, share with others and so on. In other words, they inhabit both the physical spaces and the digital spaces of the library at the same time. And they are often moving between one and the other, almost imperceptively, as their study and research proceeds. For example, a student sitting within sight of the library's research assistance desk might send an email with a question rather than walk to the desk (as is often noted in the UTS Library). Another might jump onto a social networking site to share with a friend sitting a couple of carrels away in the library. Another might be using a 'virtual library' of journals which have been licensed by the library from an aggregator and are accessible through the library's catalogue and

with a few clicks from a citation in paper or via a search engine such as Google Scholar. Yet another might check online statistics to verify an argument in a book being consulted. And another might be using professional and industry digital tools – the tools of a future professional career.



**Figure 4** Sample UTS Library Catalogue records for ‘sustainable buildings’

In other words, students and researchers who are physically located at a desk or table in a room in a library building with books and papers in front of them and with other people sitting around them and simultaneously occupy a semantic space in which they find relevant documents, images, video and audio, blogs and tweets, and many other resources which are central to their study and research. They are both in a distinct and familiar (although changing) physical space and in a less simply describable but no less real cognitive space.

UTS Library and an increasing number of other academic libraries have gone some way towards bringing these different kinds of spaces together. The UTS Library catalogue lists both the tangible resources – books, journals, DVDs, kits, etc – that the Library holds and the digital resources – ebooks, ejournals, online reports, etc – that it licences or obtains through open access arrangements. In the one search, a UTS Library client can find relevant materials in both realms and obtain the shelf numbers at which the tangible resources are located and links to the digital resources (see Figure 4). Digital wizardry ensures that clicking on the title will take the client to a fuller record for each of the resources, and clicking again on “Electronic Version” will go directly to the ebook, ejournal or other resource via embedded links. In that ‘catalogue space’, the digital resources line up with the books, bound volumes of journals and other items sitting on the library’s shelves for immediate availability. Catalogue records are augmented with images of covers to offer a way to browse online but, in the process, to blur further the distinction between tangible and digital.

*The central question to be addressed in designing the Library of the Future is: how to bring together digital and physical spaces into a coherent whole?*

The information discovered in this way is then used by the learner or researcher, again in both digital and tangible environments. It may be 'cut and pasted' into a report to be printed and distributed, added to a digital research folder, or shared online with colleagues. The University – through UTSONline and the suite of software developed and made available by the Information Technology Division as well as the Library's services – enables students and researchers to apply relevant information through activities – writing, compiling, analysing – in digital spaces. And, increasingly, the Library takes advantage of Web 2.0 technologies to make scholarly information more readily available and to offer ways of personalising and sharing it through services such as Facebook, Twitter, YouTube and RSS feeds – all of which operate within, and sometimes create, digital spaces. For example, the Facebook user has a digital community of friends who share experiences and interests without the limitations of location and timing which would apply in the physical world.

But, despite the support for digital spaces and the bringing together of discovery and use of digital information resources, the digital and tangible continue to be described and conceptualised as different realms. Thus, the central question to be addressed in designing the Library of the Future is how to bring together the digital and tangible spaces into a coherent whole which can be managed as a whole. To achieve that conjunction would be to truly create a Library of the Future which would communicate a holistic understanding of twenty-first century learning and scholarship to our clients so that they can navigate the ever increasing oceans of information to reach their goals.

## More than a non-place

Aiming for this combined sense of digital and physical space makes the library much more than one of the 'non-lieux' (non-places) identified by Augé (1992) as characteristic of the current age of what he called 'supermodernity'. Non-places are the installations required for the accelerated movement of people and goods, such as motorways, interchanges and airports, which have no sense of place but are solely means to go somewhere else (p.48). Augé argued that "a space which cannot be identified with identity, relationships and history must be defined as a non-place" (p.100). Libraries, and their digital and haptic spaces, cannot just be 'gateways' or 'portals' or 'learning commons'. To fulfil their roles and their responsibilities to their communities, they will be places laden with identity, relationships and history.

This must be true of the Library of the Future. It will be a place of learning, in all the senses of that word, for the twenty-first century. It will be a place in which the students and scholars of the twenty-first century can navigate the rapidly increasing volumes of digital scholarly information while continuing to take advantage of the scholarship recorded in the past and that which is still being published in tangible formats. To do this effectively, the Library of the Future has to be a real place, not just a portal, but a place dedicated to learning, with facilities, services and expertise which advance that learning. And that place has to exist in both tangible and digital realms, in the spaces that students and researchers occupy, use and enjoy. To do this effectively, there will be a conjunction of the realms which spans and merges facilities, services and expertise with facility interactivity. Both physical and digital will coexist and interconnect.

[Context](#) and [interactivity](#) provide the answers to the central question for the Library of the Future as Rettie (2005) has suggested in regard to mobile phones. To be able to successfully join the tangible



and the digital, both will be presented in a consistent manner which creates presence for users through appropriate cues. And interactivity will be maximised to bring users together with other users and with their environment to progress learning and research. In a university library, this will mean heightened interactivity within the knowledge environment through the use of personalised and mobile technologies and the powerful capabilities of the semantic Web and its future development. And, because the users' perceptions of their relationships with the technologies and interfaces will change over time, the Library of the Future will be designed to evolve in response to technological innovations and changes in pedagogies and behaviours.

### A cautionary note

In approaching this project, we acknowledge, in Brand's (1994 p.178) words, "All buildings are predictions. All predictions are wrong." However, if we plan carefully and implement advisedly, our errors will be able to be remedied in the future. With that in mind, this report develops the elements of the planning model in a condensed form and concludes by considering some key aspects to the successful delivery and operation of the Library of the Future.

Our aim is to create a continuously adaptable twenty-first century knowledge environment that will foster the development of the intellectual climate at UTS and will continue to inspire its community of scholars and learners long into the future.

## 2 Planning

Planning for the Library of the Future is situated in an information universe which continues to include printed books and other physical resources but focuses on digital information formats, digital information discovery and usage, and changing user behaviours in intersecting physical and digital spaces. It recognises that the pace of change will not diminish and build in adaptability for the long term.

### Planning Libraries in the Twenty-first Century

It is a truism to note that libraries are built for the long term. Many have survived for many hundreds of years while some have been recreated when they have outgrown their former accommodation. A case in point is the removal of the British Library from the British Museum where it had been shaped by its famous Keeper, Antonio Panizzi, to its current St Pancras location. Others, such as the Bibliothèque nationale de France across the Channel, have preserved their former homes for traditional scholarly pursuits while taking advantage of new buildings which offer new facilities and new curatorial environments.

These observations are critical to the project to design a 'Library of the Future' if that assertion is not to be dismissed as hubris. The adventurous project to plan a novel kind of library, a novel kind of academic library in this case, is informed by a sound understanding of both the current context and likely future developments, tempered by the humility to plan to provide as much flexibility as possible to cater for the unexpected needs and opportunities that will inevitably arise.

As the first decade of the twenty-first century closes, it is clear that there have been unprecedented changes in the context of higher education and in the information environment which shapes any conceptualisation of the Library of the Future. It is no longer viable to think of an academic library in the traditional terms of 'collection space + reader space + services', perhaps with the addition of an information commons<sup>2</sup>. The advances of digital technologies have transformed the creation, discovery, use and retention of all kinds of information with major effects on education and research as well as in most other fields – from sport to security, art to administration, music to media. Planning for the Library of the Future is situated in the comprehension of an information universe which continues to include manuscripts, printed books and other physical formats but focuses on transmutable digital information objects, digital information discovery and usage, and changing user behaviours.

The emergence of that multifaceted information universe is the dominant characteristic of the early twenty-first century. With roots in the last decades of the previous century, the new information environment's impact became undeniable with the invention of the World Wide Web. No longer

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<sup>2</sup> The appending of 'Information commons' to existing libraries has become commonplace during the two decades since one was constructed at the Leavey Library at the University of Southern California, Los Angeles by converting a lower ground floor. Early examples, including that at the Leavey Library, were little more than 'computer barns' located in the library rather than in a separate IT or academic building. The dominant paradigm at the moment is the 'learning commons' which emphasises creating 'occasions for learning' beyond mere computer and information access.

were digital information systems limited to governments, large enterprises and academic and research institutions but they could be used by all. And, with the advent of social media, they could be shaped by all.

Self-evidently true in the rich developed nations, this new information environment is increasingly prevalent, at least for the better off, in all nations except those with highly repressive systems. All governments have realised that they need to ensure that their nations are engaged with the 'information economy'. That realisation led to global consideration of the issues in the World Summit on the Information Society through which the governments ratified a statement of principles and set out an agenda to address key issues including equitable access to information.

## Digital Urbanity

However, it is in the highways and byways of the information society that the information revolution is most evident. "I am an electronic *flâneur*. I hang out on the network." wrote William J Mitchell in *City of Bits* (1995: 7). As his influential book foresaw, the 'bitsphere' and geography are competing and finding ways to interrelate. Cyberspaces intersect physical places to create a new digital urbanity, an urbanity which remaps the global information landscape. In many ways, this is the task to address in creating a Library of the Future: to go beyond the existing digital library (which is further discussed below) to create a new digital information urbanity that will transcend the boundaries and limitations of both physical and digital realms.



**Figure 5**      **Digital urbanity – we are here?**

Every day, students and other members of the community negotiate this digital urbanity. As students travel to the University, they may be listening to music or a podcast of last week's lecture via an MP3 player while checking library resources from their smart phone and sending an SMS to a friend. The streets and suburbs that their bus or train passes through may be familiar to them but no less familiar are the digital spaces in which their music and podcasts reside – perhaps stored on their



MP3 player or streamed from a server – and the other tools they use. When they get to the University, perhaps after a few hours working, they might study in the Library’s learning commons together with friends. During the lively, and sometimes noisy, sessions they will be seated or lounging on ottomans in the Library surrounded by other students. But they are likely also to be connecting simultaneously to others, perhaps students in their study group who might be still at work, and multi-channelling to check websites while downloading articles which could be useful for a group project. This is digital urbanity: traversing the biblio-blogsphere by simultaneously placing oneself, communicating, and collaborating in both physical and digital spaces. The sites, paths and portals of cyberspace intersect with their physical correlates to form ever-changing metropolises of the mind.

At its core, the project to create a Library of the Future is about applying this understanding of digital urbanity to the role and functions of the academic library to create a new type of academic library for UTS. Over the last decade, the UTS University Library has vigorously developed digital library services, re-envisioned both its physical and digital spaces, and implemented new discovery and information management technologies. The new study spaces are very different from the traditional halls of carrels surrounded by bookstacks and the digital spaces form recognisable locations that are visited via Facebook, Twitter, YouTube and the Library’s new discovery system, Endeca. Now the challenge is to better integrate those realms in recognition of the coming together of architecture and ‘bitsphere’.

## Digital Urbanity & Public Spaces

A particular opportunity lies in the conception of public space. In many ways, the University Library has traditionally been a public space for the University community, the University’s ‘commons’, both in the sense of providing a shared bank of knowledge to inform study and research across the disciplines of interest to the University community and in offering a neutral but safe third space in which members of the community can work communally. It offers a space without surveillance in which students and researchers are free to pursue their interests and to work collaboratively or simply communally with others.

*To what extent can and should the University Library be open to the public?*

In the physical realm, providing that ‘third space’ was a question of providing a safe, secure, managed, information rich and supported environment that all members of the University community could enter and use. In the digital realm, it is a little bit more difficult to conceptualise and implement. The boundaries of what is ‘in’ – UTS Library digital space – and ‘out’ – cyberspace – are less clear, especially to the user. Conversely, however, the boundaries imposed by licences – who’s in, who’s out – are all too firm. But, as Mitchell reminds us, it is necessary to claim and reclaim public space which cannot just be “what’s left over when everyone walls off their private domains” (p.125). So, to be the University’s third space, the University Library will be openly accessible and welcoming to the University community<sup>3</sup> and it will

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<sup>3</sup> Mitchell (1995: 125) recalls Lynch’s statement that public space is only genuinely public when it is truly openly accessible and welcoming to its community (Kevin Lynch, 1981, *A theory of good city form*, Cambridge MA, MIT Press).

promote open access to scholarly literature (see below). For the Library of the Future, improved accessibility will be partly addressed by the new location which will place the Library at the epicentre of five of the seven faculties. But the imperative also emphasises the need [to design the Library to be as openly accessible and welcoming as possible](#) so that it can be the University's *agora*. At a practical level, it will be possible to enter and leave both the Library's physical and digital spaces in multiple ways, through multiple entrances and exits, and to find easily congenial spaces for study and interaction.



**Figure 6** University Library of the Université Paris 8 at Saint Denis, located at the transport hub of the University and the suburb

However, the desire to offer a public space also brings into focus a key question for UTS with its commitment to community, professional and industry engagement: [to what extent can and should its University Library be open to the public?](#) At the first level, the response is obvious. The University community is understood broadly to include adjunct and visiting staff, collaborators and partners and all should feel welcome and be able to enter and use the Library's physical and digital spaces easily.

But opening to the broader Sydney community, and potentially visitors from elsewhere is more problematic. While the University is committed to community engagement and the goal of rendering the campus more 'porous' is an important aim of the campus redevelopment program, the UTS campus is situated in the central business district of Australia's largest city with all the complexity that entails. In seeking to promote digital urbanity in that location, challenges include:

- vulnerability to theft and, possibly, assault within or entering and leaving the buildings – this demands a [strong security regime](#);
- a ring of competing public and private educational institutions including some which have reciprocal or contractual partnership arrangements for library access with UTS and others

which are parasitic, offering nothing to UTS students but drawing on study space and access to resources – this demands a [nuanced way of regulating access](#);

- the need to provide a sense of value to UTS students and staff – this demands ways of offering [specialised benefits to those affiliated with UTS](#);
- a location surrounded by public and private organisations in the arts, design, media and other fields with which UTS wishes to promote collaborative relationships – this demands ways of [attracting and welcoming current or potential partners](#) to both its physical spaces and resources and its digital spaces and resources, access to many of which is constrained by the terms of licences;
- the University's commitment to community engagement – this demands ways of [attracting and welcoming members of the public and private researchers](#) with interests that might be assisted by access to the University Library to both its physical spaces and resources and its digital spaces and resources, access to many of which is constrained by the terms of licences;
- fostering the intersection between creativity and technology – this envisages the University Library as [a cultural site which should be open to interested members of the public](#), showcasing the creativity of UTS and its partners.

These and other challenges will be further discussed in succeeding sections of this report. It will attempt to distil design principles to address them in planning the Library of the Future as a built environment, and as a supplier of resources and services to support learning and research.



**Figure 7**      **A window into the university: the University Library of the Université Paris 8 at Saint Denis**

The list of challenges is much the same as that relating to the University as a whole but the list is given particular emphasis by the desire to make the Library of the Future an open and welcoming commons for UTS and for the broader community. While laboratories, faculty spaces and administrative offices may be somewhat invisible within campus buildings, the University Library will

be located on one of Sydney's major boulevards, Broadway, and, like major libraries elsewhere, will become in many ways a window into the University – again, in both digital and physical realms.

The challenges are also similar to those faced by many other semi-public environments in large cities including museums and art galleries, central city libraries (such as the State Library of NSW) and shopping malls. They are the interrelated needs to balance openness with security, sharing with 'value adding', manageability with diversity. What makes the UTS project significant is that it is attempting to go beyond a physical solution by addressing the challenges as an expression of digital urbanity.

## 2.1 Information environment

Academic and research libraries are essential to research and education because they make available the scholarly and other information which is at the core of the discovery and transmission of knowledge – the key roles of universities and research institutes. This is not to say that researchers and students cannot obtain and share information in other ways but is to recognise that academic and research libraries fulfil a special and unique set of functions within the processes of education and research. Those functions include the provision of information resources to allow students to learn about disciplines and questions which they are studying in their courses, to enable researchers to assimilate a corpus of knowledge, to permit students and researchers to undertake free enquiry, and to support general curiosity and education. But they also include the development of skills in identifying, locating, evaluating and using sources of information – information literacy – and providing – collectively with other libraries and publishers – the record of human knowledge. The functions are significantly shaped by the information environment in which the libraries and their users operate.

*Academic and research libraries are essential to research and education because they make available the scholarly and other information which is central to the discovery and transmission of knowledge*

The invention of the World Wide Web as a system of hyperlinked information objects in 1990 (World Wide Web 2009) has had the most significant transformative effect on the information environment since Gutenberg's innovation of moveable type transformed Europe – and subsequently the world – five hundred years earlier. Just as Gutenberg was not the first to invent moveable type, the Web did not create digital information. But, again like its predecessor 500 years ago, the Web innovation was adopted rapidly across national borders as it re-imagined access to knowledge. Not only has it transformed the supply of information but, dramatically, the demand for information and expectations about its availability. No longer a scarce commodity to be accessed with difficulty, information has become a 'give away' in such abundance that its value is diminished. The effects of the Web continue to proliferate throughout all areas of human life – health, government, commerce, education ... – with far reaching consequences.

Just as the Gutenbergian project transformed the opportunity and later the need for literacy, challenging religious and temporal power in the process, the ever growing oceans of Internet accessible information objects are challenging business models, organisational structures and power relations. In the academic sphere, research is morphing into eResearch and education is exploiting



both complex enterprise systems and mobile, flexible social technologies. Because information is plentiful and easily accessed (if not always efficiently or effectively), merely filling ‘empty vessels’ with it is no longer a viable aim for education: the educative process will now be truly transformative, developing knowledge, skills and human potential.

The dimensions and implications of these changes will be explored further in subsequent sections.



**Figure 8** The pre-Web idea of the library: Brera Library, Milan

For academic libraries the historic movement of scholarly communication from analogue to digital formats and the developing use of novel, Web based, technologies has been most evident in the transfer of almost all scholarly journals from print to digital (except for a limited number produced by small societies and institutions and some specialised titles). That process is also affecting books and other media. Printed books continue to be important for coursework in most fields and for research students and researchers in the more discursive disciplines. Availability and usage of eBooks is developing with a split evident between the growing adoption of eTextbooks in some disciplines (eg IT, business) and the use of eBook formats to offer just in time access to important but less often required research resources (eg scholarly monographs). Reference and discovery tools – including directories, dictionaries, encyclopaedias, indexes and abstracts – are now almost all digital with some historically important resources remaining solely in print. Emerging geolocation capabilities are facilitating the discovery of information in the time and place of need with tools drawing on contextual data with implications for the use of management of the ever increasing information (Isomursu 2008).

The changes have not been limited to the shift from physical to digital and the exploitation of the potentialities of digital technologies but, in addition, the business models have changed dramatically. Large conglomerate publishing houses such as Elsevier and Taylor & Francis dominate the publishing of scholarly journals and increasingly books leading to marked market distortion and strains on university and library budgets. However, the open access movement has grown in strength as demonstrated by Edgar & Willinsky (2010) and is beginning to offer a viable alternative.

UTS Library has made its contribution through the UTSeScholarship initiative which comprises UTSePress, UTSiResearch and UTSeData. Together, they demonstrate that the academy can regain control of scholarly communication if it should have the will to do so.

For UTS, the historic change from physical to digital publication has enabled a tremendous expansion in the range of resources available to support its expanding learning and research activities. One indicator demonstrates the rapidity and extent of the change: from the late 1990s, the UTS Library journal collection grew from less than 6,000 journal titles, almost all printed, to well over 30,000 titles, some 95% delivered digitally.

The challenges and opportunities for academic libraries are profound. They demand new approaches which incorporate but go beyond such steps as changing the use of physical spaces and delivering digital information resources 24/7 to the clients' desktops. UTS has done both, with considerable success. The reinvention of most spaces in the Blake (City) Library and many at the George Muir (Kuring-gai) Library has transformed their use and the satisfaction reported by students. The implementation of digital library services through early adoption of digital information formats – 'electronic preferred' – and innovative tools (eg Metalib/SFX, Endeca) has positioned the Library well as a round the clock provider of scholarly information to students and researchers.

Artificial intelligence Computational grids (Computer systems) Computer networks Security measures Computer programming Electronic commerce Expert systems (Computer science) Intelligent agents (Computer software) Internet Knowledge management Knowledge representation (Information theory) Multimedia systems Ontologies (Information retrieval) Ontology Programming languages (Electronic computers) Semantics Semantic networks (Information theory) Semantics Data processing Web services Web site development World Wide Web XML (Document markup language)

**Figure 9 Semantic cloud in UTS Library Catalogue**

## Semantic Discovery

A very significant innovation by UTS Library has been the implementation of the Endeca discovery software to provide a new form of library catalogue which is more 'Google like' in its user interface but also offers a range of Web 2.0 features. As they are progressively implemented, those features will enable students to engage much more interactively with information resources than was possible with traditional library catalogues. They will, for example, be able to 'tag' and 'label' resources for their relevance, usefulness and so on. They will be able to go beyond the mere customisation of 'MyLibrary' (a rather pedestrian listing of bibliographic records that has been possible with integrated library management systems for some years) into a more interactive space.

However, the more significant aspect of the Endeca innovation, a direction which was begun within what is now called the 'classic catalogue' (ie the Online Public Access Catalogue or 'OPAC' provided as a module of the Millennium integrated library management system by Innovative Interfaces Inc) environment, is to refocus from the catalogue as a tool to deliver physical locations – shelf numbers – to become [a tool for delivering semantic locations](#) – links and relationships. This is a profound

change which is central to the creation of the Library of the Future. The first stage of this change, implemented in the classic catalogue, was to provide 'hot links' directly from catalogue records to digital resources including ebooks, ejournals and multimedia. These links enabled the user in the Library or elsewhere to click through to an ebook, open it up and start reading. Or to connect similarly to an ejournal, view its contents pages, select an article, open it and read it. The implementation of the Endeca software has taken this further by presenting the discovered resources within the broader context of the Library's collections through various tools including a 'cloud' of terminology (see Figure 4), terms which can be clicked to pursue further associative relationships.

Ambit and granularity are the other main differences between the new UTS Library Catalogue and traditional library catalogues. Where traditional catalogues, although powerful, were limited to the books, journal titles and other materials physically held or digitally licensed by the library, the new Catalogue embraces a much wider range of information resources. Rather than being limited to bibliographic objects – books, journal titles and the like – it offers great granularity by searching at the article or other subsidiary level. Initially providing discovery of the materials in the traditional catalogue plus the UTS research outputs located in UTSiResearch and the open access scholarly books, journals and conference proceedings published by UTSePress, it is extensible to many other sources of relevant scholarly information. It is thus similar to the National Library of Australia's new discovery tool, Trove (<http://trove.nla.gov.au>) which it predated by a few months and which uses the tagline "one search ... a wealth of information".

## Digital spaces

Recognition of the need to provide better tools for semantic discovery is an important response to the rapidity of the shift to Web enabled information resources. However, a more central issue, which has major implications for the conception of the Library of the Future as well as being demonstrated in the need to develop information literacy skills, is that the shift has strained our capacity to envisage those resources.

*Identifying what is meant by 'place' in the emerging conception of the library of the future is therefore the key question in creating a 'library of the future'*

Until the 1970s, libraries were solid, respected institutions with collections of books, journals, archives and audiovisual materials that could be seen, felt and passed from one hand to another. Even the introduction of microforms from the 1950s, which dramatically increased the accessibility of rare resources by reproducing and distributing copies worldwide, had not reduced the tangibility of collections and the libraries which held them.

Implementation of online access to computerised bibliographic databases in the 1970s, with much quicker and more flexible enquiry systems, rapidly transferred indexing and abstracting tools such as Engineering Index and Chemical Abstracts from tangible multivolume sets to invisible, digital resources. A semantic process replaced the haptic process of turning a page, checking an index and selecting a citation to an article but it was still necessary to go to a shelf, open a volume and turn to the article to read it. And it was still possible to imagine those databases, somehow, as digital

versions of the print publications since they continued to grow month by month and the field structure more or less corresponded to that in print. They could aptly be described as ‘virtual information resources’ as they often were. We could think of a ‘virtual library’ as a library service which made use of those virtual resources to provide information just as a traditional library used its print collections to make information available. The virtualisation of the digital consisted in the imposition of a tangible image on an intangible resource.

Introduction of hypertext linking and the Web made that process of virtualisation impossible because it became so easy to link from collection to document, from document to document, from an element of a document to another document or an element in it, in and out, round and round. Linking has become so easy that it is possible to get lost, forgetting where one started or even the purpose of the visit. This is no longer a ‘virtual library’ but a very real, digital library that is intangible. For the Library of the Future, we are searching for ways to envisage that digital library and to marry it with the co-existing physical libraries. The oft used term ‘hybrid library’ is unhelpful because it suggests a relationship which is unconsummated. It is more satisfactory to accept that the idea of the library is in a process of rapid change, similar but much more rapid than the changes which resulted from the Gutenbergian revolution that progressively replaced the idea that libraries were places to read individual manuscripts (even if many were copied, each copy had its own specifics) with a conception of libraries as places to read or borrow exemplars of published multiples. Thus the ‘library of the future’ will be a ‘place’ to access information in multiple formats which will mostly be digital. Identifying what is meant by ‘place’ in the emerging conception of the library of the future is therefore the key question in creating a library of the future. Clearly, it spans both tangible and digital resources and embraces semantic associations with physical arrangements receding in importance. This question will be explored in Chapter 4.

## 2.2 The Sustainable Collection Model

The innovations made over the last decade have prepared the University Library to develop and adopt a novel model for its collection strategy, the Sustainable Collection Model, shown diagrammatically in Figure 10. This embraces both digital and physical realms and locates the University Library’s delivery of information within the ever expanding biblio/blogosphere. It operates in an information environment that extends well beyond the traditional understanding of a university library’s collections to embrace both printed resources and other media in other libraries as well as the digital resources licensed by UTS and the plethora available via the Web.

This model responds to the practice oriented and research inspired nature of education at UTS. Students need to access both the scholarly literature relevant to their disciplines and the creative and public media in which their careers will be situated. For research students and researchers it supports both immediate and in depth information needs.

The model proceeds from the high demand and high usage teacher specified learning resources to time of need research resources while may be located in remote libraries or on the Internet. BONUS<sup>4</sup>, interlibrary loans and reciprocal access protocols enable ready access to the breadth and

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<sup>4</sup> BONUS+ is a consortium of eight university libraries in Australia and New Zealand which use the INNReach software from Innovative to share monographic resources. Unmediated client requests obtain delivery within



depth of resources needed by UTS researchers and students who enjoy boundaryless discovery and use. Its five bands extend out from the owned or licensed, and immediately accessible, to the unowned resources in other libraries or on the Web, resources to which, nevertheless, the University Library provides some pathways.

The model recognises that a single university library, no matter how well funded or endowed, can only collect a proportion of the world's scholarly publications in physical formats and that there will be limits to collection growth, that it is unreasonable to continue to add storage space for physical collections unless the library has a responsibility to preserve the publishing record within defined areas. In the digital context, it accepts that the prospect of 'holding' or even 'bibliographically controlling' the ever burgeoning digital resources is inconceivable. While academic and research libraries continue to collect physical resources of relevance to their institutions and to license high priced scholarly ejournals and ebook collections, those activities are located within the wider information environment in which the growing trend towards open publication, open access and free exchange of materials is becoming the dominant paradigm. The model recognises that the resources on which the library's clients draw encompass both the traditional books and journals and their digital analogues and also the wider resources available digitally and seeks to provide a framework for supporting access and making rational collection decisions.

The model is considered to be a [Sustainable Collection Model](#) because, in recognising the limits faced by an individual university library, it focuses on the transitions between its bands, the porosity of the membranes between the bands. That is, how do *Priority learning and research materials* become *High use materials* and then revert? And how are *Priority learning and research materials* relegated to *Foundation learning and research materials* and the latter discarded in favour of *Extended learning and research materials* and so on? In doing this, it accepts a steady state upper limit to the size of the physical collection held by the library and focuses on the decisions that are made to administer that collection to provide effective support for learning and research. It is thus responsible in regard both to the ongoing cost of acquisition, management and deselection and to the capital costs of providing collection storage. In regard to digital materials, it is sustainable because it seeks to take advantage of the trend towards openness while continuing to manage currently needed but highly expensive subscriptions effectively.

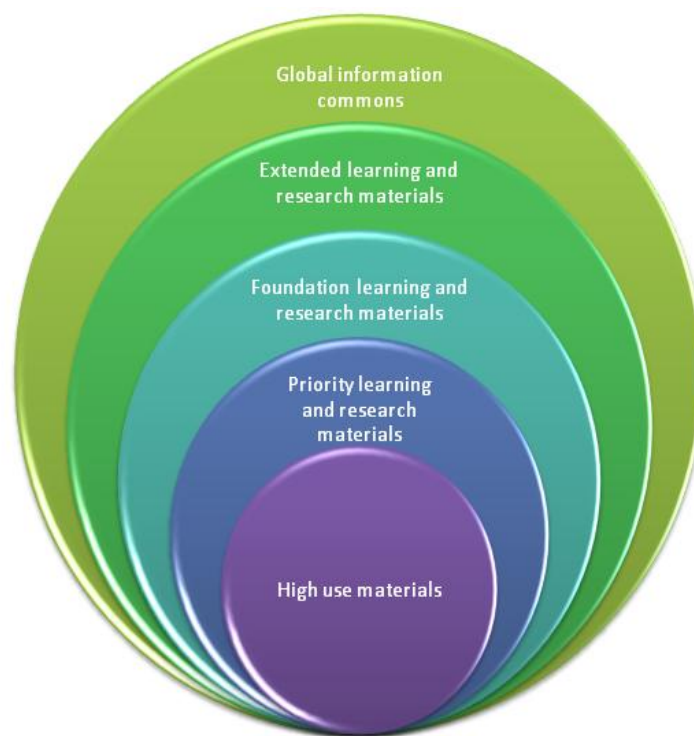
*The Sustainable Collection Model accepts a steady state upper limit to the size of the physical collection and seeks to take advantage of the trend towards openness in digital materials.*

At this point, it is important to note the history of 'steady state libraries'. Steady state collections for academic libraries were proposed some 40 years ago (Steele 1978). The idea foundered, to some extent because of the ambition of librarians and their universities to be the best which was translated as having the largest collection and such 'input oriented' metrics are still used to compare the merits of university libraries. However, leaving aside institutional pride, the idea of maintaining collections at a constant maximum size failed because both the bibliographic and delivery systems of the time were unable to pass required materials sufficiently promptly from one library to another.

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4 days from as far away as Perth or New Zealand. The cost of the service per item is approximately 10% of the cost of supplying an interlibrary loan.

Not only did digital publishing and delivery systems not exist at that time but interlibrary loan systems, while extremely valuable and valued and quite effective, tended to be slow and expensive. The UTS Sustainable Collection Model is based on the capacity of contemporary systems to deliver information almost immediately digitally where possible, and very promptly via courier delivery when physical copies are required.



**Figure 10** UTS Library Sustainable Collection Model

Within the UTS Sustainable Collection Model, the first three collection bands comprise what has traditionally been regarded as an academic library's collection, the materials it collects and manages to support its university's learning and research programs which usually include a general collection and a number of special collections focussing on areas of special interest to the university or its region. In a physical sense they are the books, journals, audiovisual resources, microforms, manuscripts and other materials that the library has collected, described, lent and retrieved, preserved, and eventually perhaps discarded. Digitally they are the electronic resources for which the library continues to pay licence fees to obtain access and those which it has created or digitised itself (or by its institution) or obtained freely through exchange or open access.

In the first, and innermost, collection band, *High use materials*, is the most highly controlled segment of the collection. In it are the resources needed very quickly by coursework students which have to be readily available. Physical resources – books, DVDs, etc – are managed through closed or open reserve and usage has to be rationed by imposing short loan periods because of generally high competition from students. Digital resources – born digital or digitised copies of articles, book chapters, etc – are managed through eReadings and links from the University's online learning system, UTSOnline, and will be recorded and tracked through the Digital Resources Register to ensure compliance with copyright provisions.

The second collection band, *Priority learning and research materials*, might be described as the core collection to support the university's learning and research programs. It covers the licensed ebooks, ejournals and other eresources which are central to those programs, receive the most use and are unlikely to be cancelled without major change in institutional direction. It also includes the university's own research outputs which are preserved and made available through a repository such as UTSiResearch. Physical items in this band are found in the general or open access collection where they attract relatively high use. Except, perhaps, for some enduring works, they eventually succeed to the third band as they age and usage decreases. Confirming that usage is not the sole criterion but is matched with significance, this band also includes the materials located in rare books collections or other special collections relating to major focal areas and in their digital counterparts. For UTS, the digital counterparts are those which are developed and managed through the UTSeScholarship initiative and include: the University's higher degree theses added in digital format to the Australasian Digital Theses Program; the University's output of research publications stored in UTSiResearch; the journals, conference proceedings and monographs published by UTSePress; and the research data curated via UTSeData including that which is secured in managing the Australian Social Sciences Data Archive (ASSDA - NSW Node) and the Aboriginal and Torres Strait Islander Data Archive (ATSIDA). The development of other digital special collections is a priority for UTS Library as the University focuses more on the intersection of creativity and technology: the specific scope of such initiatives remains to be determined.

The third collection band, *Foundation learning and research materials*, represents the broader collection which the library has assembled to support the university's programs. It enables students, teachers and researchers to more broadly explore topics of interest and, necessarily, the items in it attract more episodic and limited usage – but vital to the reader when required.

*The development of digital special collections must be a priority for UTS Library as the University focuses more on the intersection of creativity and technology.*

The digital resources in this band are the lower priority licensed resources which might be sacrificed under budgetary pressure but are nonetheless important to researchers, teachers and students in the fields to which they relate. Physical items are the less frequently used printed and audiovisual materials that might be kept in dense storage or separate stacks. At UTS, they will be kept in the Automatic Library Retrieval System to be constructed under Alumni Green behind the new Library.

Although less frequently used, the foundation learning and research materials include classic works which are of immense importance to the study of particular disciplines and need to be readily available when required. Nevertheless, items in this band will continue to age and lose relevance and most – except those classic works – will eventually be relegated to the fourth collection band, *Extended learning and research materials* which comprises the resources of relevance to the study and enquiry at UTS but not actually owned by UTS Library. These materials may include those transferred from UTS to a consortial store such as the CARM repository operated by CAVAL in Melbourne from which they can still be retrieved for use at UTS within a day.

Thus the extended learning and research materials band takes the conception of the library's collection beyond the resources which are owned or licensed by the library. The materials in this band may, however, be legitimately considered to be part of the broader library collection because

use of them by the library's clients has been arranged by the library through negotiated access agreements, reciprocal borrowing agreements, interlibrary loan protocols or shared access systems. For UTS Library, this band includes the books available through the BONUS+ consortium, materials which might be located in the CARM repository, books and journal articles available through interlibrary loan, films available through loan or hire services, and the access to the collections of all Australian university libraries available via the University Libraries Australia (ULA) scheme. Those collections are often complementary to the library's owned collection – included in the first three bands – and selection and deselection decisions are often made in the context of the resources that are available via those arrangements.

The experience of BONUS+ is instructive. Since its establishment, the proportion of monographic items (ie books, audiovisual and other non-serial items) which are owned uniquely by a member library in the consortium has remained at around 70%, indicating very low collection overlap, while the number of participating libraries has grown from four in the initial trial to the current eight. In October 2009, the combined holdings of BONUS+ were 3.4 million titles and 4.5 million items. This meant that the effective collection at UTS Library, the range of titles available for delivery to its clients, was multiplied more than seven fold<sup>5</sup>.

In a digital sense, this fourth band comprises the emerging network of repositories for scholarly publications to which UTS contributes by operating UTSiResearch and which are most usefully identified via the Directory of Open Access

Repositories, *OpenDOAR*

(<http://www.opendoar.org>). With the growing acceptance of the concept of the Data Commons and the involvement of libraries in maintaining the infrastructure, they are being joined by research data stores such as those which UTSeData operates. In aggregation, it is the shared digital resource which is being constructed through international collaboration (Law 2009).

*This conception of the Library's collection places the Library in an enabling role and challenges it to engage with the corpus of recorded knowledge rather than a subset which may be held or licensed.*

The fifth and final collection band, *Global information commons*, is the most rapidly growing and most amorphous. In a physical sense, it comprises the bibliosphere, the approximately 160 million books plus journals and other resources held in the world's libraries and, at least theoretically, available at least to scholars who make application for access. Although not owned or made available through agreements made by the library, these resources can properly be considered within the ambit of the library's collection model because they are resources on which scholars draw and resources on the existence of which the library's selection decisions are in part predicated. Furthermore, they are being brought into the bitsphere as the traditional bibliographies in which they have been listed are increasingly becoming supplemented and extended through making catalogues available via the Web and useable through mass digitisation programs such as Project Gutenberg, Google Book Search and Europeana. The library recognises the importance of this

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<sup>5</sup> In view of the low level of duplication among Australian university libraries, it has also provided for a greater return on the universities' investments in the monographic collections.

bibliosphere to its clients by assisting them to access it through developing their capabilities and by providing or linking to pathways through bibliographies, collection guides and other tools.

Digitally, the fifth band comprises the open World Wide Web, the ever expanding network of hyperlinked resources which can be found via search engines and are generally readily available at a few clicks. These resources can also be considered part of the library's collection model because, again, they are resources which the library's clients use and to which the library provides some guidance at least through developing client capabilities and providing or pointing to some guides or other assistance. The focus on information literacy by academic libraries recognises that clients need the skills to locate and assess the value of resources on both the open Web and the hidden Web. Further, the adoption of tools such as Google Scholar responds to the need to separate materials which are of potential scholarly value from the plethora of other resources found by a search engine.

This is quite a different collection model to those previously applied and which were conceptualised through such tools as the Conspectus assessment method. Rather than focusing on what is held and licensed by the Library, it focuses on access to the resources and on building pathways to them. Some of the pathways are very well defined bibliographically and some, especially for materials that need to be immediately available, hinge on ownership or licensing to guarantee access. Others are not owned or licensed but access is facilitated through negotiated agreements which create easy pathways. And, finally, access to the many less widely used resources, tangible and digital, is largely left to the enquiring student or scholar with the Library providing some guidance and assistance but not creating pathways. This conception of the Library's collection places the Library in an enabling role and challenges it to engage with the corpus of recorded knowledge rather than a subset which may be held or licensed.

UTS Library is now endeavouring to find measures, quantitative or qualitative, which will indicate its success in meeting its collection objectives in each of these bands, considering both the impact (usage or other measure of effectiveness) and affect (satisfaction) achieved.

## 2.3 Pedagogical imperatives

A US National Research Council synthesis of research into educational effectiveness identified four characteristics of effective learning environments to be (Bransford et al 1999 p.121-142):

- **learner centred:** pay careful attention to the knowledge, skills, attitudes, and beliefs that learners bring to the educational setting
- **knowledge centred:** take seriously the need to help students become knowledgeable drawing on well organized bodies of knowledge
- **assessment centred:** feedback is fundamental to learning
- **community centred:** promote a sense of community that increases people's opportunities to interact, receive feedback, and learn.

The report noted the importance of alignment between these characteristics and of developing knowledge pathways (p.127):

“Knowing where one is in a landscape requires a network of connections that link one's present location to the larger space.”

These elements of effective learning should be advanced by the Library of the Future. It will provide learning spaces that respond to the needs, skills and attitudes of the students, which suggests a [diversity of spaces](#) that will support students appropriately as they engage with different forms of learning. The learning spaces will be [knowledge rich](#) so that students can draw on well organized bodies of knowledge and to be able to place relevant knowledge in context. They need to learn to distinguish relevant and reliable sources from those which may be ephemeral or specious. While working in the Library of the Future, students should also be able to create their own feedback processes – such as corroborating with fellow students or checking alternative sources – to verify their learning as well as receiving external feedback via formal or informal assessment.

The Library of the Future will also facilitate [collaborative learning and collaborative knowledge production](#) which Tapscott and Williams (2010) have described as an overdue radical paradigm shift in higher education. This Twenty-first Century model of higher education will use open access content, open courseware and social networking - all of which UTS Library is applying – to create a more flexible and pedagogically sound education system. And, in doing so, it will renew the sense of becoming a member of a community of scholars, a community of people focused on learning and the application of knowledge.

And it will do all of those things in the context of new technologies and new media especially the mobile technologies discussed below. This implies a need to develop students' information literacy, the skills in acquiring and handling information which are essential today (Cope & Kalantzis 2001; Bruce 1997). Those literacies operate within a higher education context that has been dramatically changed by new information and communication technologies, especially the Internet and World Wide Web, a context which continues to change rapidly. Looking back less than a decade to the attempt by Dutton and Loader (2002) to describe the opportunities and challenges perceived at the millennium demonstrates the pace of change. Predictions about the impact of technologies and medias on learning will therefore be made cautiously but will nevertheless be made because information and communication technologies are profoundly changing the acquisition and use of data, information and knowledge and consequently learning.

## Mobile technologies

Perhaps the most significant develop is the marked shift to mobile technologies which has accelerated over the last five years. The fast adoption of Internet capable handheld devices and laptop computers by students in the United States is evident in the findings of the annual *ECAR Study of Undergraduate Students and Information Technology* (Smith, Salaway, and Caruso, 2009). Although limited to students in the United States, the benchmark study has been repeated annually since 2004 and provides a lead indication of trends that are likely to be followed in other countries.

The 2009 study shows that 51% of students own an Internet capable handheld device, with 12% more planning to purchase one within a year. Although 35% of those who own a device do not access the Internet with it due to cost and other alternatives, [the shift to mobile devices is marked](#). This is underlined by the findings that virtually all have mobile phones and that laptops are rapidly replacing desktop computers. Most students have new computers: 79% of freshmen own a laptop one year old or less, two-thirds own a two year old laptop or desktop. Desktop ownership has decreased from 71% to 44% while laptop ownership has increased from 65% to 88%.



This trend to mobile technologies has clear implications for the Library of the Future. There will be a need to [supply ubiquitous and extremely reliable broadband wireless connectivity and multiple, easily accessible power outlets](#) for recharging the laptops and handheld devices. There must be no inhibition to downloading course materials and other resources, including media rich resources.

However, while the study did not indicate the proportion of the US students who do not own either a desktop or laptop computer and it is clear that it is a small percentage, [the University must take account of the needs of students without computers](#). This is confirmed by the repeated feedback from students in surveys at UTS (and similarly at other universities) that there are not enough computers in the library. The University must provide adequate numbers of computers in various configurations in appropriate locations to support students who do not own a computer or are unable or unwilling (usually for reasons of security) to bring it to campus.

However, it is not just a question of the portability of the devices, the [mobility which is becoming so evident is mobility of communication, interaction, content and learning](#). As a French commentator has noted, “it isn’t just the telephone which has become portable but the ‘other’” (Viviant 2009). The devices are ever more embedded, ubiquitous and networked , constituting a connected multimedia device that is always with the user (Naismith et al 2004; Margaryan et al 2008). The Internet has become both personal and portable and is integrated with ‘context-aware’ capabilities that are transforming everyday activities by enabling capture of details of the time, location, surrounding people around and environment.

New Learning	New Technology
Personalised	Personal
Learner centred	User centred
Situated	Mobile
Collaborative	Networked
Ubiquitous	Ubiquitous
Lifelong	Durable

**Table 1 Convergence between learning and technology (Sharples et al 2005)**

A student may use a laptop or, more and more frequently, a smart phone or personal device such as an iTouch<sup>6</sup>, to compile notes, share information, read a paper from the Library’s eReserve, check some websites, scan an eBook, and so on. And the students do this with others working on the same topic or with friends in the library, creating a social learning environment. As indicated in Table 1, a convergence is emerging between new personal and mobile technologies and new conceptions of lifelong learning raising questions about the site of learning “to understand how people artfully

<sup>6</sup> Apple iTouch (<http://www.apple.com/ipodtouch>) is a portable multifunction device which enables users to listen to music, watch movies, play games, take notes, surf the Internet, send email, find directions, etc. It has similar characteristics to the Apple iPhone (<http://www.apple.com/iphone>) without the connectivity. Similar products are being marketed by other suppliers.

engage with their surroundings to create impromptu sites of learning” (Sharples et al 2005). As Naismith et al (2004 p 36) noted:

Such technologies can have a great impact on learning. Learning will move more and more outside of the classroom and into the learner’s environments, both real and virtual. Learning will involve making rich connections within these environments to both resources and to other people. In addition to consulting internet-based resources on the move, learners will be able to manage the administration of their learning through consultations with their personal diaries and institution-based virtual learning environments. The ability to instantly publish their observations and reflections as digital media will empower them to be investigators. Context-aware applications will enable learners to easily capture and record events in their life to both assist later recall and share their experiences for collaborative reflection. Opportunities for distributed collaboration and mobile team working will be greatly enhanced.

The technologies are profoundly disruptive (Christensen 2000) in shifting the student’s attention from the physical and social context into the virtual context of digital spaces (Cornelius & Marston 2009). Moving into that learner-created cognitive space may be one of the distinguishing characteristics of some new forms of learning, dubbed ‘mobile learning’. Cornelius and Marston note that the virtual context helps to “highlight the important role and potential of the disruptive nature of intrusive communication channels for learning activities” and suggest further investigation of the disruptive power of mobile devices to ‘frame-switch’ users between physical and virtual contexts (Bell 2009; Wali, Winters, and Oliver 2008).

The issue of presence also deserves further exploration in connection with teaching and learning. Baños et al. (2005, 90) note that “many authors assume that a person feels present in an environment when his/her cognitive processes lead to a mental representation of a space”.

Libraries have responded to the demand for social learning environments by creating ‘learning commons’ from the early prototype at the University of Southern California’s Leavelle Library through examples such as those at the Northern Territory University in the mid 1990s to the contemporary purposefully designed environments such as those in the Blake Library at UTS or Murdoch University Library. Support for online learning, use of Internet platforms and, latterly, adoption of Web 2.0 technologies, especially social media, have extended the libraries’ presence into the digital environments inhabited by students.

## User contributed content

The Web 2.0 emphasis on user driven, conversational technologies is evident in the findings of the ECAR study but principally for personal use rather than coursework perhaps because of the limited familiarity of academic staff with new technologies which was also reported by students. The study found that student use of social networking sites is nearing saturation, used by over 90% daily, while Instant Messaging is declining. In spite of the extensive use of social networking outside class only 28% use the sites for class work. Use of wikis in coursework was at a similar level, 25%, blogs at 11%, and podcasts at 6% (but 33% for personal use).



A marked feature of the changing use of technology is the shift to online video with the respondents preferring to watch their choices online when it suits them rather than follow television schedules. But video is no longer only a spectator activity as 45% contribute to video websites such as YouTube. The much touted online virtual worlds such as SecondLife appear to be waning in interest since only 8% reported use once per quarter or semester.

Parallel with this adoption of Web 2.0 technologies, the university and library websites continue to be vital sources of information, used at least weekly by nearly 95% of students. This suggests that there is considerable potential benefit to be obtained by [translating the authoritative services to Web 2.0 environments](#) and by [making library services visible in social networking services](#), as UTS Library has begun to do. The benefits include enhanced visibility and convenience – which was highly prized by respondents to the ECAR study – but in addition the opportunity to attract user contributed content can create an enhanced and attractive suite of resources.

## Secure to learn

In the ECAR 2009 study, cited above, 80% of students considered themselves to be very skilled or expert in their ability to search the Internet effectively and efficiently. A smaller percentage, 58%, rated themselves as similarly expert in evaluating the reliability and credibility of online information and less than half, 48%, in understanding the ethical and legal issues surrounding access to and use of digital information. Allowing for an element of over confidence in the self reporting, this indicates that students are very comfortable with the available search technologies but that there is evidently a need for continued emphasis on developing information literacy among students both to assist those who are less confident of their abilities and to challenge those who are perhaps overconfident.

*Recognising that students experiencing difficulties may often be facing a complex of challenges, it would be desirable to have a neutral 'triage' point to secure assistance quickly*

The ability to find information efficiently and effectively, to evaluate its reliability and credibility, and to understand how it can be used are central to university education and to future careers in the information society. Without developing those skills, students cannot be expected to be confident learners.

But confidence in learning also depends on feeling secure to be able to focus on study. Risks which can create a sense of vulnerability include personal safety, financial, social and health factors as well as the core educational issues. For a university located in the central business district of a major international city and adjacent to the primary transport hub, personal safety will always be a central issue because of the potential for robbery and possibly attack. UTS has dealt with that risk successfully over many years but [managing personal safety will continue to be a vital concern](#) especially if the Library of the Future is to be open to students and possibly the public for very extended hours, up to 24 hours per day.

The University provides support for students' financial, social and health issues through dedicated services: Student Services Unit, Equity and Diversity Unit, Students' Association. While those services are well regarded and effective, there is a concern that some students may 'slip through the

net' by failing to locate or be referred to the services at times of need or, sometimes, by being embarrassed to seek assistance.

Failure to find or use appropriate services can also hamper students' educational development in crucial areas such as use of the English language and academic communication skills. Recent studies have shown that an unacceptably high proportion of students are unable to express themselves adequately in English and, in addition, many students experience great difficulty with standard academic practices such as referencing and the conventions for writing essays and reports. At UTS, the ELSSA Centre develops these generic skills through programs embedded in courses and also provides a remedial service to individual students which are, however, limited by the number of staff available to offer sessions to students. Students frequently seek assistance from Library staff in some of these areas, especially referencing, because they are using the Library and because of its perceived neutrality in academic matters. The ELSSA Centre and the Library are collaborating to develop a 'one stop shop' of self education resources for use by those students who can develop their own skills. But, again, there is a concern that some may 'slip through the net'.

Recognising that students experiencing difficulties may often be facing a complex of challenges (eg academic skills + financial worries + social isolation), it would be desirable to have a [neutral 'triage' point](#) at which students with underlying concerns could be identified, without stigmatisation, and referred directly to the appropriate service.

## 2.4 Research imperatives

Contemporary research is characterised by more collaboration at the research group level and across institutions, across nations and internationally. Collaboration includes data sharing and reuse and intensive communication which are adopting new modes outside the established scholarly publications system.

The established system nonetheless remains important to provide the record of research findings and offer the most accepted tool for assessing the quality and impact of research and hence the standing of the researchers. This leads to the second key characteristic of contemporary research, competition. Competition is central: for research funding, for publication, for commercialisation, for reputation (individual and institutional), for successful evaluations in research assessment processes, for outstanding colleagues and for research students. At the core of competition lies reputation which is fed by recognition and also leads to greater recognition. This is manifested in research and research infrastructure funding but is most visible in publications especially those accepted by prestigious journals or publishing houses – even though the findings will have been long shared via other means.

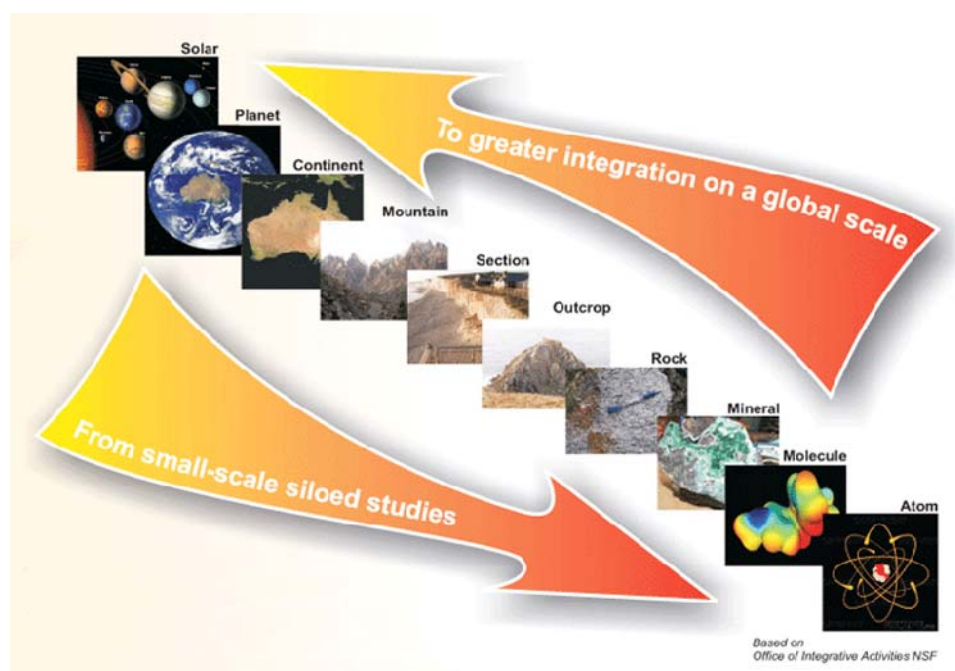
Overshadowing these characteristics, however, is the rapid trend towards eResearch that hinges on the capture, analysis, retention and reuse of data. Although initially seen in 'big science', eResearch is now evident in all disciplines as researchers turn to information technology to compile and analyse data and information.

All of these characteristics have implications for the Library of the Future as do other questions including the predicted shortfall in qualified researchers (leading to increased competition for the

best), purposeful linking of research and teaching, and greater calls for public accountability. The rest of this section explores the issues which will most condition the shaping of the Library of the Future.

## Data intensive research

The future of research is data intensive research, generally labelled eResearch or eScience. This rubric includes research that uses sophisticated equipment that can generate immense quantities of data and information for analysis (as in astronomy) and research which starts with data and information that is already available (as in financial markets research). Speaking on the future of research in science and technology, Goble<sup>7</sup> (2008) refers to this as 'data intensive science' which includes both large and small scale data collection. At the 'big end' are new high throughput experimental methods (microarrays, combinatorial chemistry, sensor networks, earth observation, sky surveys, ....) featuring increasing scale, diversity and complexity of digital material processed separately and in combination and implying large scale data analysis, data integration and aggregation, highly dependent on automation.



**Figure 11** The integration ladder (from National Science Foundation<sup>8</sup>)

At the other extreme is 'small data' recorded in spreadsheets, personal lab books, and other local tools but born digital and increasingly publicly shared, usually through the web, although generally privately held. The consequence is that much research now starts with the data and that data are much more likely to be reused to re-examine the same question or to enable a fresh investigation.

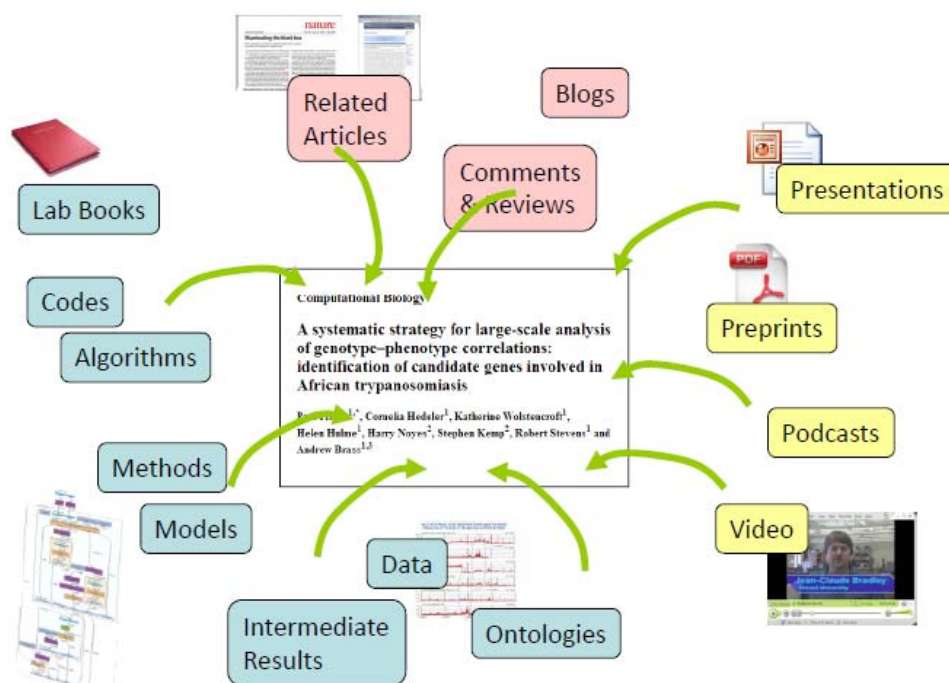
<sup>7</sup> Carole Goble is Professor of Computer Science at the University of Manchester, the Director of the myGrid project which produced the Taverna open source software, and chairs the Open Grid Forum Semantic Grid Group.

<sup>8</sup> Used by Simon Cox and Laurent Lefort, 'A standard information transfer model scopes the ontologies required for observations', *Biodiversity Information Standards (TDWG)*, Fremantle, 30 September 2008, <http://www.tdwg.org/conference2008/program>, accessed 30 October 2009.

For this and other reasons, including a greater appreciation of the cost of generating data and the challenges of reproducibility, there is increased emphasis on research data retention and reuse. This imperative is becoming accepted practice within disciplines and is increasingly recognized and mandated by research funding agencies. As the US National Institutes of Health stated in 2003, “... all data should be considered for data sharing” and:

“Data should be made as widely and freely available as possible while safeguarding the privacy of participants, and protecting confidential and proprietary data. To facilitate data sharing, investigators submitting a research application requesting \$500,000 or more of direct costs in any single year to NIH on or after October 1, 2003 are expected to include a plan for sharing final research data for research purposes, or state why data sharing is not possible.”

Similar statements have been made, with more or less force, by other research agencies including the Australian Research Council and National Health and Medical Research Council in Australia, the Wellcome Trust in the UK, and their counterparts in other nations to require recipients of research grants to retain research data and make it available for reuse if possible. Although such policies have not tended to incorporate enforcement mechanisms to compel compliance, the requirements are becoming more categorical and more enforceable. Universities must take control of the management of research data to be ready to comply with these requirements as UTS has through the establishment of UTSeData which operates the NSW node of the Australian Social Science Data Archive and the Aboriginal and Torres Strait Islander Data Archive.



**Figure 12** A research data digital ecosystem (from Goble 2008, slide 22)

Universities should also take advantage of the opportunities that exist in a more collaborative, more open research environment like that indicated schematically in Figure 12. This has major

implications for research education, the fostering of early career researchers and the provision of research support services through libraries, information technology units and research offices.

Taking advantage of the methods offered by new digital technologies, especially those labelled 'Web 2.0', research practice in many fields is becoming more mobile (similarly to the student behaviour discussed in section 2.2) and more open. UTS Library's application of Web 2.0 technologies, which was initiated in 2008 and is mentioned above, in part responds to the growing use of blogs, wikis, pod and vodcasts and other recently developed software applications and services in eResearch. In scientific publishing, books and electronic journals are becoming more integrated with databases, blogs, and other digital media on the Web (Hull et al 2008).

Openness is evident in inputs (sources of information and data) and outputs (communication and publications and sharing – see below). Tools such as electronic laboratory notebooks are being adopted. A research team at the Garvan Institute, for example, uses eCAT ([http://www.axiope.com/electronic\\_lab\\_notebook\\_index.html](http://www.axiope.com/electronic_lab_notebook_index.html)) to record experiments and manage data over the web:

"eCAT is absolutely essential to the running of my lab. Everyone uses it as an electronic notebook, so they can compile the diverse collections of data that we generate as biologists, such as images and spreadsheets. We use it to take minutes of meetings. We also use it to manage our common stocks of antibodies, plasmids and so on. Finally, perhaps the most important feature for us is the ability to link records, reagents and experiments. This allows us, for example, to connect an experimental mouse with the tube containing its tissues in the freezer, to the 6 different experiments (conducted over a year) that analysed those tissues in different ways. Managing this kind of 'metadata' is absolutely essential to our work, and very difficult to do without tools like eCAT."<sup>9</sup>

*Recognising these trends, UTS Library became active in data curation when it launched UTSeData in 2008: that initiative must be extended to strategically position UTS in the new digital ecosystem of research.*

Others are using open source and open access tools such as those gathered under the label 'Open Notebook Science'<sup>10</sup>.

As a whole, this new research environment is beginning to be seen as digital ecosystem that includes 'input', 'process' and 'output' elements and is characterised by complex interactions<sup>11</sup>. While mostly and increasingly digital, researchers in this environment may draw on archives, printed

<sup>9</sup> Dr Alex Swarbrick, head of the Tumour Progression Research Group, Garvan Institute of Medical Research, Sydney, [http://www.axiope.com/electronic\\_lab\\_notebook\\_learn\\_feedback\\_ga.html](http://www.axiope.com/electronic_lab_notebook_learn_feedback_ga.html).

<sup>10</sup> Bradley, Jean-Claude, 2007, 'Open notebook science using blogs and wikis', *American Chemical Society Symposium on Communicating Chemistry* 27 March 2007, *Nature Precedings*, doi:10.1038/npre.2007.39.1, <http://precedings.nature.com/documents/39/version/1>.

<sup>11</sup> Multidisciplinary approaches to managing digital ecosystems involve fields such as data management, web technologies, networking, security, human-computer interactions, artificial intelligence, e-services and self-organizing systems. They are being explored through conferences such as the ACM Conference on Management of Emergent Digital EcoSystems: MEDES09 was hosted by the Institut National des Sciences Appliquées de Lyon (INSA-Lyon), 27-30 October 2009, <http://sigappfr.acm.org/MEDES/09/>.

books and other tangible information resources especially in the humanities. It is a participative model which takes advantage of the 'collective intelligence' of collaborators, peers and – sometimes – audience. Its processes lead to accelerated dissemination and faster feedback loops. It integrates the roles of author and publisher and requires seamless interlinking of data, publications and other research inputs and outputs.

Responding to this institutionally is not simply a matter of depositing the data in a data store. The data – which may be from many sources and in multiple formats – need to be adequately curated. This places emphasis on the skills of librarians to ensure that data are adequately described, carried forward through future technologies and managed in accordance with research and other relevant protocols. Disciplines and institutions have responded by developing services such as arXiv, Science Commons, UsefulChem, the UK Data Archive, Cambridge Crystallographic Data Centre and the Inter-university Consortium for Political and Social Research (ICPSR based at the University of Michigan) which are developing the new field of research data curation.

The implications of these developments for libraries and information services are far-reaching. As Goble notes, libraries need to be embedded within these environments for discovery, management and curation of the outputs. Fulfilling these roles demands capacities to handle many requirements, including: identity resolution; version management; security and privacy policy management; and metadata propagation; selective quality curation; integrated search across external resources. It builds on the long history of libraries, information services and archives in managing not only printed publications but many other records of research including manuscripts, letters, notes and sometimes artefacts.

Recognising these trends and positioning itself as a curator of digital research data, UTS Library became active in data curation in 2008 when it launched UTSeData. That initiative has focused on operating the NSW Node of the Australian Social Sciences Data Archive (ASSDA) and initiating the national trusted repository for Indigenous research data (Aboriginal and Torres Strait Islander Data Archive – ATSIDA) but also endeavours to provide guidance to UTS researchers in regard to data management planning and practice. That initiative must be extended to strategically position UTS in the new digital ecosystem of research

## Open Access: the future of scholarly publishing

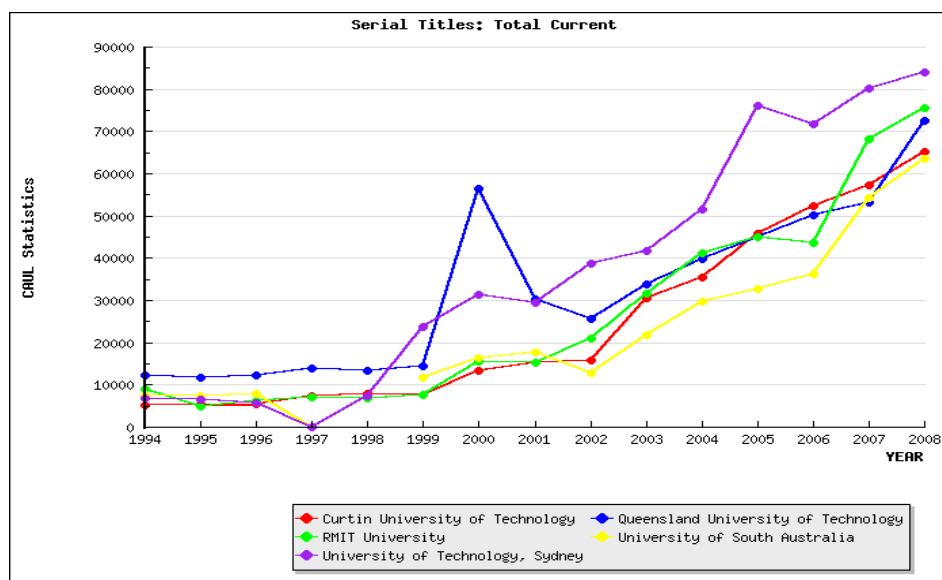
While the adoption of new technologies is diversifying, accelerating and significantly opening the 'invisible college' for communication of research results, they yet have to replace the peer reviewed scholarly journal, or in some fields conference paper or monograph, as the accepted means for placing findings on the international record of research and scholarship. There are good reasons for the continued need for a 'publication of record'. It provides a defined report which has been subjected to quality assurance through peer review and can then serve as a proxy measure for the success of a research activity. Because of the initiation or acceptance by a discipline of a publication as a record of research findings and because members of the discipline both create the content and assure its quality, the publication is 'owned' by the discipline rather than an external accreditation agency which might be subject to external manipulation. And, thirdly, as a defined object, the publication can be archived for future consultation while maintaining its integrity and it can be



connected to other research reports through citations and, increasingly, to the datasets supporting its findings.

This publication of record could not be satisfactorily replaced by a blog, wiki or other ephemeral or changeable communications, although they may well amplify it and enable rapid, continuing and expansive dialogue about the research. However, the publication of record need not be in the form to which we have become accustomed: it could become a much more embedded expression of research findings which can be linked dynamically to other publications and communications. And it can become a mutable, changeable publication provided that, for quality assurance purposes, a researcher (or quality auditor) can return to the quality assured, defined report.

The contemporary form of the publication of record is most often a relatively brief peer reviewed article published in a scholarly journal. In some fields, peer reviewed conference papers hold pride of place, information technology with the supremacy of IEEE and ACM conference proceedings being the prime example. In others, especially the humanities, a longer narrative in a scholarly monograph is preferred. However, publication of scholarly monographs is in decline while journals continue to grow and the number of journals continues to increase rapidly.



**Figure 13** Total current journal subscriptions at the university libraries of the Australian Technology Network

Most of the journals are now offered primarily via digital subscription or licensing; for UTS, well over 90% of the journal titles are received digitally. This historic shift from printed issues which were received and owned by the academic libraries to licences to access digital issues, sometimes with provision for ongoing usage of the issues published during the period of subscription if the library should cancel the title, has profoundly changed the economy of scholarly communication.

This has been a profound change, which has brought great benefits but also risks. At UTS and its partners in the Australian Technology Network, for example, the availability of journals has

increased dramatically as shown in Figure 13<sup>12</sup>. The data in the graph also demonstrate characteristic of current journal subscriptions which has become dominant over the last decade: subscriptions to most journal titles are now made by licensing digital aggregations from the major suppliers such as EBSCOnet. One consequence is a high level of duplication since a particular journal may be included in the aggregations from several suppliers often with differences in its presentation, comprehensiveness of content included (eg inclusion of advertisements and other ‘non scholarly’ content which may be important in some fields) and embargo periods. For UTS, this means that the true number of unique titles available in 2008 has been artificially inflated from 32,000 to over 80,000. Nevertheless, the growth has been impressive: at UTS the total of unique journal titles has increased fivefold from under 6,000 in 1996 to over 30,000 in 2008.

There is another, much more serious, implication of the changed dynamics of the market for scholarly journals. The process of commodification had proceeded from the 1960s and led to ever increasing prices for prized journals especially in biomedicine and other scientific and technological fields. Because of the effective lack of competition – if you want to read articles in *Brain*, you want those articles not those published in another neuroscience journal – long standing publishers such as Elsevier were able to exploit a virtual monopoly behind the protection of copyright. Several became wealthy multinational corporations which could manipulate markets by varying pricing to gain and then exploit business opportunities in different countries. With the shift to digital publication, this process has accelerated, leading to increased market dominance by a few suppliers each of which has unique content that is in demand by researchers, and is padded out with journal titles of lesser relevance or interest. In partnership with many scholarly academies, the dominant publishers had ‘vertically integrated’ by demanding assignment of copyright in the articles they publish, controlling editors and the peer review process, aggregating and finally seeking to control the measures of quality and impact through selling evaluative tools.

*The Library of the Future will build open access into its management of resources and services.*

Recognising that this commodified business model for scholarly publication is unsustainable and reasserting the importance of the ‘commons’<sup>13</sup>, the Budapest Open Access Initiative (<http://www.soros.org/openaccess/read.shtml>) was launched early in 2002 with the support of the Soros Foundation. This was followed in 2003 by the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities* (<http://oa.mpg.de/openaccess-berlin/berlindeclaration.html>) which firmly stated the commitment of universities to open access to scholarly information and outlined a process for achieving it. This is becoming a movement to reassert control of the dissemination of scholarly knowledge as Hess and Ostrom outlined (2001). An element of that movement, UTSePress was launched in January 2004 and has now grown to be the largest publisher of open access scholarly journals in Australia.

<sup>12</sup> Data from Council of Australian University Librarians annual statistics, <http://www.caul.edu.au/stats>.

<sup>13</sup> The commons – shared domains of land, knowledge and culture – are best managed and protected through collective action, not by regulation or business as has been demonstrated in the work of Elinor Ostrom: *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990); *Understanding Knowledge as a Commons: From Theory to Practice* (ed with Hess, Charlotte, MIT Press, Cambridge MA, 2006).

Although the trend towards open access is in its infancy, impressive gains have been made already. Some highly expensive scientific journals have been replaced by open access titles with the editorial board moving to the new title to confirm its standing. Many titles from universities and scholarly associations have moved to digital open access publication (eg *Public History Review* published by UTSePress) with considerable benefits especially in terms of increased readership and a broader pool of contributors and reviewers. Others are 'born digital' such as *PORTAL Journal of Multidisciplinary International Studies*, the first journal published by UTSePress which has quite a distinct focus from previous journals in international studies and is now highly regarded in the field. They are examples of how open access journals are gaining greater recognition and prestige with a number highly ranked in the ERA and other journal rankings.

The examples demonstrate how the open access idea has disrupted accepted models of scholarly communication, firstly in niche areas and then becoming accepted as the Public Library of Science (PLOS) journals have come to be regarded as appropriate places to report scientific findings. These trends exemplify the patterns of disruption identified by Christensen and Raynor (2003).

Major initiatives such as BioMed Central (<http://www.biomedcentral.com>) have been very significant in improving the accessibility and reducing the cost of biomedical information. Its journals have built up high reputations in a very short space of time and are now serious alternatives to the high priced journals published by Elsevier and others. Its business model is based on submission fees from authors with options for libraries or universities to join by subscribing annually to cover or subsidise submission fees. The journals published via such initiatives as well as more local journals exposed for discovery through OAI protocols are increasingly rendering accessible important literature from countries such as Brazil which had not been adequately represented in the scholarly literature that had previously been readily available internationally.



**Figure 14 Increased impact due to open access to research outputs (SPARC)**

There is growing evidence that open access to research findings increases impact through both enhanced public communication and through increased citation rates as is shown in Figure 14. It's

capacity to integrate easily with Web 2.0 technologies gives it the potential to become the primary model for scholarly communication in the coming decades. It will be able to deliver rapid dissemination, high impact, deep data and accessibility while supporting collaboration between researchers and the long term need to preserve the record of research and scholarship.

And, finally and most significantly in regard to journals, the success of open access can be seen in the rush by the big commercial publishers to adopt open access policies and test 'open access' business models, which nevertheless maintain their 'for profit' predilection. These early signs and the increasing emphasis by research funding agencies on requiring open access to research findings as a condition of funding indicate that open access to scholarly information will become the dominant model. It must, however, retain the aspects of quality assurance and preservation of the record which have characterised scholarly journals since the eighteenth century.

For conference proceedings, the trend has been towards rapid publication of papers and presentations on websites prepared for the conferences or maintained by sponsoring associations or institutions, often with CD-Rom versions distributed at the conference in lieu of printed papers. While offering timely availability, these processes generally do not ensure that the record is adequately preserved for future reference and it is often difficult to determine whether papers have been subjected to quality assurance through peer review.

Over the last two decades or more, the scholarly monograph has been in decline because the sales of print copies, perhaps 300 copies worldwide for many titles, do not justify the costs of publication and distribution. Nevertheless, it remains an important way of expounding ideas and knowledge through extended argument and continues to be the favoured mode of communication in the humanities, some of the social sciences and some other fields. Open access has delivered the mechanism for the academy to resume control of monograph publication as programs such as Highwire Press and ANU E-Press have demonstrated so effectively. UTS has made a start with a few monographs published through UTSePress but is collaborating with the Public Knowledge Project in the development of a more robust platform, Open Monograph Press (<http://pkp.sfu.ca/omp>).

*It is desirable to create 'sites of encounter' in which researchers and students can meet informally and interact in neutral territory.*

For the Library of the Future, these trends mean that it will not only be a participant in the open access movement, as UTS Library is through operating UTSePress, but it will build open access into its management of resources and services.

And there is a further implication. The importance of libraries collectively continuing to maintain the record of research and scholarship is therefore crucial. Libraries cannot just rely on the publishers to maintain the authoritative archive but will support initiatives such as those by the Koninklijke Bibliotheek (Royal Library of the Netherlands - <http://www.kb.nl>) to hold on an escrow basis all the publications, digital or print, of major Netherlands based publishers (including Elsevier). UTS Library participates in the Portico preservation and electronic archiving service (<http://www.portico.org>) as both library and publisher for the same reason.

## Fostering collaboration

Research increasingly team based and there is some evidence that teams produce more highly cited research with “virtual communities of scholars” producing higher impact work than comparable collocated teams or individual scientists. The teams extend beyond individual universities or research institutes to include both members and collaborators elsewhere. They include researchers in industry and collaborators in the professions with their participation recognised through funding schemes such as the ARC Linkage Grants. They operate within frameworks of engagement with business, industry and the professions. Long standing relationships with firms can foster the open exchange of information and provides opportunities for collaboration in research and the provision of consultancy services.

The boundaries of universities and university libraries can hinder research by offering barriers to this desired pattern of open collaboration. For the libraries, the boundaries include access to the library premises, which is within the control of the libraries, and access to licensed digital information, which is generally not within the control of the libraries. UTS’s Library of the Future will support research collaboration by providing ways for collaborators to be recognised as participants in UTS research work – as ‘members’ – and will create digital and physical spaces to facilitate research collaboration and support it through timely advice and assistance.

## Research assessment

The Excellence for Research in Australia (ERA) process in this country reflects the increased focus on accountability for research funding and on the imperative to try to assess the quality and impact of research. It has parallels in other nations including, notably, New Zealand and the United Kingdom. Although the forms of assessment will doubtless continue to evolve, it is evident that research assessment will become an ongoing feature of research management nationally and internationally.

UTS Library has collaborated with the University’s Research and Innovation Office to create a ‘dark archive’ of all the research publications emanating from UTS since 2002 to support the University’s claims under the Research Excellence in Australia framework.

*The Library of the Future will create digital and physical spaces to facilitate research collaboration and provide support through timely advice and assistance.*

The archive is housed in UTSiResearch which operates in conjunction with the research management system RMEweb to provide an integrated research output management facility. RMEweb offers the single interface for researchers who can be confident that their publications will be safely held in UTSiResearch and readily available to provide the evidentiary database for assessment of the University’s research performance. The integrated system will also support the creation of much more effective ePortfolios for researchers to enhance their profiles as well as the developing Web 2.0 enabled eResearch infrastructure.

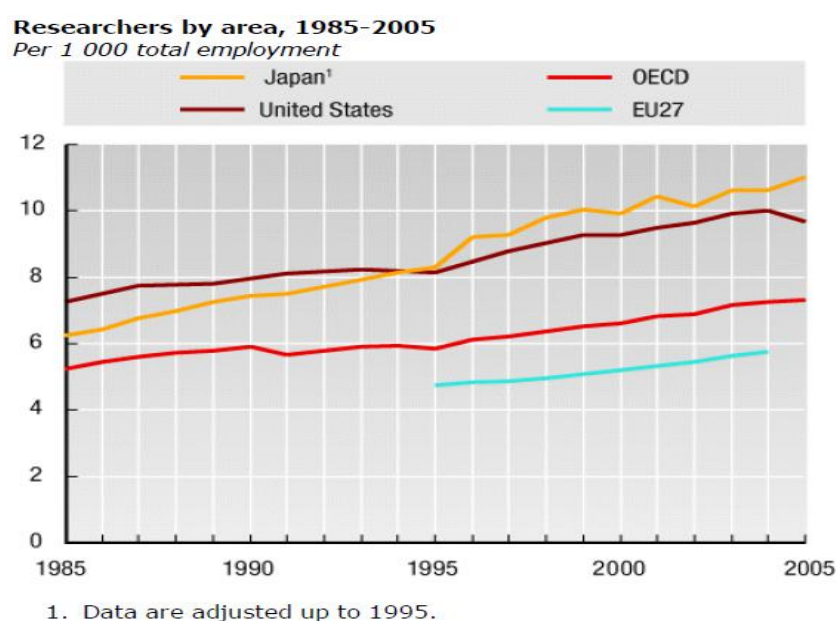
The other aim of the system is to ensure the widest possible dissemination of the University’s research output because that that has been shown to increase impact and citation rates. To that end, the Library has developed a copyright clearance process so that as many publications as

possible can be cleared for open access as quickly as possible. They are made available via UTSiResearch which is harvested by discovery tools such as Google Scholar.

## Early career researchers and research students

Universities in Australia and other OECD nations have identified a forthcoming shortage of capable researchers. Although the basis of this argument has been questioned<sup>14</sup>, there has been a significant growth in demand for researchers (see Figure 15) and decline in at least some sources of supply (domestic graduates in several nations, for example).

In Australia, the focus has been on the imminent retirement of the 'baby boomer generation' researchers and the need to replace them. This has led to programs to support doctoral students and support early career researchers. UTS Library has played some part in such initiatives, mostly in collaboration with the University Graduate School. The steady growth of participation in the Australasian Digital Theses program is an example of applying UTS Library's technological skills to this University priority.



**Figure 15 OECD Science, Technology and Industry Scoreboard 2007 (OECD <http://lysander.sourceoecd.org>, accessed 2 November 2009)**

However, given the combined needs to recruit and retain first class researchers at UTS and to take advantage of the new modes of research, the Library of the Future will be configured in such way that it assists with those priorities. This suggests that the Scholars' Centre, constructed in the Blake Library in 2003, should be both expanded and imaginatively redeveloped in the Library of the Future.

<sup>14</sup> For example: Cervantes, M, 2003, 'Scientists and engineers: crisis, what crisis?', *OECD Observer* No. 240/241, December, [http://www.oecdobserver.org/news/fullstory.php/aid/1160Scientists\\_and\\_engineers.html](http://www.oecdobserver.org/news/fullstory.php/aid/1160Scientists_and_engineers.html), accessed 2 November 2009.



## Research and teaching

A major feature of the UTS model of learning is its emphasis on research informed teaching. Many of the Library's initiatives to expand access to research outputs – including the participation in ADT and the creation of the UTSeScholarship initiative – are relevant to enhancing student access to research that has been pursued at UTS. However, those programs have been inadequately linked to teaching and learning.

A start has been made with the new Catalogue introduced in mid 2009. It offers more sophisticated information discovery which extends across UTS research outputs and UTSePress publications and will progressively offer more Web 2.0 options such as tagging. The Library should, however, work with the Teaching & Learning and Research & Research Training Committees to determine how to take greater advantage of these resources and the plethora of other research findings which are now readily available on the Web through open access.

There is another aspect to the 'nexus' between teaching and research: interaction between researchers and students. To a degree this happens in the classroom when researchers teach and draw upon their own work and when researchers are invited to make guest presentations. However, it is desirable to create 'sites of encounter' in which researchers and students have the opportunity to meet informally and interact. Such sites of encounter will often be located in faculties – laboratories and common rooms in particular – but a visit to the École Polytechnique Fédérale de Lausanne has demonstrated that, for a high performing and ambitious research and teaching institution, it is essential to create that some 'sites of encounter' should be on 'neutral territory' as they are doing with their new ROLEX Learning Centre (more discussion below)<sup>15</sup>.

*Libraries will build on the ubiquitous access to research publications to embed library services in the researchers' toolkits, workbenches, browsers, authoring tools.*

## Implications for the Library of the Future

Libraries are built on the ubiquitous access to research publications which has been put in place over the last decade so that library services become embedded in the researchers' toolkits, workbenches, browsers, authoring tools. Librarians contribute their expertise, especially in metadata, information and data organisation and discovery as has been demonstrated by Patrick et al (2007). Their expertise is applied as trusted curators and data managers, authorities on formats, metadata providers and assurers, knowledge disseminators, and providers of added value content and services. And all around those contributions is the librarians' focus on finding, citation, peer review, preservation, identity, versioning, security, privacy, copyright management (Goble 2008).

One initiative which indicates how the Library of the Future should support research is the Research Information Centre (RIC), a virtual research environment being jointly developed by Microsoft Research and the British Library. The first implementation of the RIC focuses on the biomedical

<sup>15</sup> David Aymonin, directeur Bibliothèque Universitaire de l'épfl, personal communication, 22 October 2009.

researcher, as this builds on an existing strength of the British Library. To this end, the RIC was designed to encompass all aspects of this research lifecycle<sup>16</sup>:

The RIC is a workspace that presents the researcher with the most common tasks that are to be conducted in each research project. In doing so, it reflects a process model, providing structure to the research process, easy access to resources, guidance and tools to manage information assets, along with integrated collaboration services, enabling the researcher to be more efficient by helping focus on the primary activity – the research itself. “We modelled the research process as a series of phases or steps. A researcher is assumed to be working on a number of research projects simultaneously with other members of the team distributed around the world but connected to the Internet,” says Roger Barga.



**Figure 16** Schematic Model for role of Research Information Centre at British Library in partnership with Microsoft (Barga & Andrews 2008)

Hull et al (2008) advocate ‘defrosting the digital library’ so that becomes ‘more integrated, sociable, personalized, and accessible’. They argue that, ultimately, data and metadata will become less isolated and rigid, moving more fluidly between applications on the Web, assisted by emerging tools. Trust, privacy, and identity issues will need to be addressed but, in their view, digital libraries will continue to be fundamental components of e-science and of the cyber-infrastructure of the 21st century. The Library of the Future will play that role at UTS.

<sup>16</sup> Going to extremes: The Research Information Centre, <http://microsfteurope.eu/Futures/Viewer/tabid/64/articleType/ArticleView/articleId/301/Going-to-extremes-The-Research-Information-Centre.aspx> accessed 2 November 2009.

## 2.5 Sustainability

Ecological sustainability will almost certainly be the central issue of the first century of the new millennium if not longer. Nations have understood that the other goals of the United Nations Millennium Declaration cannot be delivered without achieving sustainability. Organisations big and small are engaging with the issues as are individual citizens.

At present, this engagement is especially evident in the construction of many new buildings including offices, shopping centres and laboratories. The Hewlett-Packard Laboratory<sup>17</sup> opened in January 1998 in Bristol, for example, was named one of the most visually exciting, functionally efficient and technically advanced company buildings in the UK. The centrepiece of the building is a three-level glass atrium. The open atrium area, known inside the lab as "the Street," promotes a comfortable working atmosphere and communication between groups. A glass roof provides plenty of natural light, while displacement air conditioning ensures the best air quality. In the middle of the ground floor is the café, one of the key areas of the building.

This example identifies some of the key characteristics of the building: efficiency, liveability, sociability and sustainability. All are critical: the first three will be raised later in this report while sustainability will be addressed here.

As a signatory to the *Tailores Declaration* (1990) and the Australian Technology Network's *Declaration of commitment to local, national and global sustainability* (2008), UTS has itself committed to advancing environmental sustainability. It launched a major sustainability initiative, tagged *Think.Green.Do*, and established the UTS Environmental Sustainability Policy in 2008. It has also placed enhancing sustainability as a central goal of the Campus Development Plan so the Library of the Future will be designed to be as environmentally friendly as possible both in its construction and its operation over its lifecycle.

*UTS Library wishes to go further by establishing a baseline of environmental performance across all its operations, identifying areas for improvement and tracking gains through regular monitoring.*

The University Library has made as start. In collaboration with the Facilities Management Unit, the extensive refurbishment of the Blake Library over the summer 2007/08 significantly reduced energy usage by replacing airconditioning, lifts and lighting and implementing automatic timers to switch off lights when the Library is closed. The Library has implemented automatic shutdown of client used computers to save energy when the Library is closed. To reduce use of lighting early or late, it has limited access to the building by staff, except those with after hours and emergency responsibilities, to the span of hours laid down in the Enterprise Agreement. Paper used in printers and photocopiers has been replaced with more ecologically friendly paper and the Library participates in the University's recycling and waste reduction schemes. In 2009, the University Library launched an Earth Hour competition among staff to identify ideas which might enhance sustainability in the Library's operations; that competition will be extended to Library clients from 2010.

<sup>17</sup> <http://www.hpl.hp.com/bristol/environment.html> accessed 5 November 2009.

Building related		Library specific	
Building	Construction	<b>Information resources</b>	Printed books*
	Maintenance		Printed journals*
	Lighting		Audiovisual, Microform, etc*
Furniture	Airconditioning	<b>Staff</b>	eJournals
	Water		eBooks
	Cleaning		Databases
ICT	Fixed	<b>Clients</b>	Waste
	Loose		Paper usage
	Computers		Other materials
	Printers		Waste
	Other devices		Transport
	Telephones		Document delivery**
	Networks		Paper usage
			Waste
<b>*Including transport costs</b>		<b>**ILL/ICDD/BONUS+ at UTS</b>	

**Table 2 Elements of academic library sustainability life cycle assessment**

However, the Library wishes to go further. It wishes to answer the question asked by Bisbrouck (2004, p.5): "The green library: are we today to promote buildings that are environmentally responsible, profitable, and healthy places to live and work? And what does it cost?" To do that we need to establish a baseline in accordance with the relevant standards ISO 14040-14044, identify areas for improvement and then track improvement through regular reviews.



**Figure 17 Model for a contemplative roof garden: Cloister, Santa Marie delle Grazie, Milan**

To select an appropriate indicator, the Library needs to go beyond the carbon footprint because that measure does not include all important environmental impacts. The more complete Life Cycle Assessment enables the consideration and evaluation of all relevant environmental impacts at the same time (European Commission Joint Research Centre, 2009). The international standards ISO

14040-14044 provide robust and practice-proven requirements for performing transparent and accepted carbon footprint calculations. The ISO standards also support specific means of communicating the Library's sustainability achievements through such means as environmental product declarations.

For an academic library, there is a range of activities which need to be taken into account in establishing its environmental performance. They include the elements listed in Table 2 which extend beyond the well understood aspects of building construction and operation and energy/ water/ waste considerations to include the core business of an academic library, the provision of access to scholarly information. As far as we have been able to determine such a holistic assessment of the environmental performance of an academic library has not been undertaken previously. Indeed, the recently published *How green is my library?* (McBane Mulford & Himmel 2010) ignores the information supply chain in its otherwise useful guide to opportunities to enhance environmental performance. That attention to the library supply chain and other library specific activities is yet to become a priority is evident in their omission from the Association of University Leaders for a Sustainable Future Sustainability Assessment Questionnaire (<http://www.ulsf.org>) and similar evaluative tools.

The potential direct gains of factoring environmental impact into assessments of the cost-benefit of various information delivery strategies have been indicated by Arnaud et al (2009) when suggesting that significant environmental benefit could be obtained by replacing printed textbooks with electronic books. They cite a study by the Babcock School of Management which indicated that the mass of CO<sub>2</sub> generated in the production off textbooks was five times the weight of the textbooks, four times for printer paper and three for newspaper. However, a holistic assessment will also include the environmental impact of a major shift to the use of portable devices such as the Kindle Book Reader<sup>18</sup> and digital delivery of content. Many of those issues have been summarised in a recent EDUCAUSE white paper (EDUCAUSE 2009) but need to be applied specifically to the situation at UTS and similar universities. It will also be useful to draw on some relevant work from the publishing industry.

*The design of the Library of the Future could include naturally ventilated and lit study areas, a roof garden contemplative space and a 'green wall' to introduce nature into the heart of the building*

The design of the building to house the Library of the Future will have a profound effect on its effectiveness in supporting learning. This can take sustainability considerations beyond the normal energy/water/waste dimensions to include the types of spaces which are created. They might include naturally ventilated and lit study areas, a roof garden to create a contemplative space and a 'green wall' to introduce nature into the heart of the building. Such features not only help reduce the carbon footprint of the building but significantly enhance its ambience as a place of learning and scholarship.

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<sup>18</sup> Kindle Wireless Reading Device is a software and hardware platform developed and sold by Amazon (<http://www.amazon.com>) for displaying ebooks and other digital media. It has been criticised for being a proprietary system but has recently shown some flexibility by launching a software application to enable its books to be read on Apple iPhones.



## 2.6 Student and staff opinion

UTS students and academic staff were surveyed in April 2008 to obtain a preliminary understanding of their views on the “Library of the Future”.

The views summarised below echo those obtained through the UTS Library’s feedback mechanisms including the LIBQUAL+ survey, UTS Student Satisfaction Survey, Australasian Survey of Student Engagement (AUSSE), RefTracker and the Suggestion Board (now replaced by the ‘Wallwisher’).

*ensuring that the new Library will evoke the great libraries of the world with that ambience emphasised and complemented by the inclusion of cultural facilities*

In the Library of the Future survey, nearly 90% of academic staff reported that they visit the physical Library from time to time while 98% use the resources and services online: staff are more likely to visit the physical Library occasionally but to use online Library services often. The overwhelming reasons given by academic staff for using the Library both physically and online are to access teaching resources and research resources. Online services are preferred because of their range and convenience of use. At 5-15 minutes’ walk from most parts of the campus, the current Blake Library is considered by some to be too distant across busy roads.



**Figure 18** The King’s Library in the British Library, London

Issues identified by academic staff which will inform the design of the Library of the Future included a need for quiet, preferably silent, spaces for research and to be able to drink coffee while working.



Some also called for a more scholarly atmosphere and cultural facilities and for the provision of specialist research librarians to assist research projects. The Mitchell Library and the British Library were cited as examples of a more scholarly library environment, suggesting that a sense of history and the display of rare and precious books operate to create a scholarly ambience. These issues can be addressed by ensuring that the new Library, and especially its Scholars' Centre, will evoke the great libraries of the world through such devices as the striking King's Library which looms above the grand staircase in the British Library at St Pancras. That ambience will be emphasised and complemented by the inclusion of cultural facilities within or around the new Library.

Students tend to use the Library occasionally or regularly physically and online and regard it as a key location to find both quiet places to study and places to study with friends. They wish to use computers in the Library but consider the Library to be only one of the locations for computers on campus. The Library is a valued location for group work along with other places on campus. Issues identified by students in relation to the physical Library facilities at the time of the survey included noise, overcrowding, availability of computers, reliability of wireless connectivity, need for more group study rooms and more presentation preparation rooms. These issues confirm the need for many and various digitally enabled learning spaces to be included in the new Library and for effective management of spaces, computer provision and connectivity, and of the doppelganger vibrancy/noise.



**Figure 19**      **A vibrant learning space, Blake Library UTS**

*It is desirable to create 'sites of encounter' in which researchers and students can meet informally and interact in neutral territory.*

The results of this survey provided useful information on the perceptions and expectations of the current UTS community but did not offer any vision of the shape the new Library might take. Understandably, survey respondents commented on what they currently experience and consequently, responses were dominated by current concerns. To engage the university community with the 'idea' of the Library of the Future it will be necessary to trigger discussion by presenting ideas and exemplars drawn from elsewhere and our own ideas so that they can express their views and, hopefully, take the ideas further to create a new library which will stand as a Library of the Future for many years.

## Library users

These findings, reinforced by observation in many libraries, demonstrate that those who use the library exhibit diverse behaviours. Some are the archetypal ‘silent scholars’ – *Bower Birds* – who work privately and quietly on their investigations and resent interruption or intrusion. They are quick to frown or shush at any sound. ‘Social learners’ – *Finches* – work steadily and quietly in the company of others and are encouraged to apply themselves by being surrounded by other students and researchers. They tolerate murmured questions and comments which show mutual support combined with respect for the concentration of their fellows: these sounds remind them that they are working in the society of others. ‘Active learners’ – *Budgerigars* – prefer to engage with others, especially friends and colleagues, to share and compare findings and ideas while they are studying. They enjoy a vibrant environment which can get quite noisy at times. ‘Timid learners’ – *Quail* – are those who are unsure of themselves, often feeling that they do not belong in university because of their age or educational background and can include international students who are unfamiliar with the mores of Australian higher education. They need, but are unlikely to request, support to be able to learn with confidence. They can often feel overwhelmed by the others, forced to adapt to a learning behaviour which doesn’t suit them. Some disrupt others and need to be managed including the selfish – *Cockatoos* – who do what they want but are unconcerned about the effect on others. And there are those who prey on other students, stealing their phone, laptops, purses and books; they need to be excluded.

Of course, while most students and researchers have predominant behaviours, most adopt different behaviours at different times. When focussed on completing a task, they might be ‘silent scholars’ resenting any diversion or interruption. When trying to get motivated or completing a group project, they might prefer ‘active learning’.



**Figure 20** DOK Library Concept Centre, Delft

Effective management of the learning environment requires the Library to create the right conditions for each:

- Silence for silent scholars– *Bower Birds*
- Quiet study areas for social learners– *Finches*
- Vibrant learning commons for active learners– *Budgies*
- Approachable support for timid learners– *Quail*
- A strong, self managed ethos backed up, if necessary, by effective sanctions to control the disruptive– *Cockatoos*
- Security to prevent thieves– *Mynahs*.

## 2.7 Models & exemplars

Since the Millennium, significantly different models for public libraries have emerged in several nations. They have built on the existing traditions of public library service – free access to information in community based services – but extended them by embracing new media, developing new services and presenting both in vibrant environments featuring exciting architecture and interior design.

A pioneering initiative was the original Idea Store Strategy, approved in 1999, which has radically transformed the performance of library and information services in the London Borough of Tower Hamlets, moving them from being among the worst in London to among the top performing in the country (*Idea Store Strategy 2009*). Idea Stores were designed to deliver ‘in a way that captured the best traditions of the library movement and education sector but present them in an exciting way – one that draws in new users and retains existing users.’ As well as the traditional library service, Idea Stores offer a wide range of adult education classes, along with other career support, training, meeting areas, cafes and arts and leisure pursuits – all brought together in easily accessible spaces which are modelled on retail environments. Following the largest consultation exercise ever carried out by the Council to establish what residents wanted from the Idea Stores, significant service remodelling and capital investment led to the opening of the first Idea Store in May 2002 in Bow. It was followed by Idea Store Chrisp Street in July 2004, Idea Store Whitechapel in September 2005, and Idea Store Canary Wharf in March 2006. A review in 2009 confirmed the original findings and proposed a refinement of the strategic objectives to guide the delivery of library, learning and information services in the Borough more focused development with an emphasis on health and employment related information over the next ten years.

Drawing on the experience of the Idea Stores, the DOK Library Concept Centre (Figure 20) in Delft, Netherlands re-presents the public library as a retail operation in the centre of Delft’s shopping centre (Boekesteijn 2008). DOC attempts to distance itself from ‘welfarist’ notions of the public library and is ambitious:

“DOK is on a mission to become the world’s most modern library. In order to do this we believe we need to have the best communication with our users possible. Therefore we are working very hard on innovations. One of these has been presented recently on a seminar and is called TANK U. TANK U wants to be a place in town where people may download information on their mobile phone. Made available free of charge by their public library to inspire users with suggestions for reading, viewing or listening. Not the usual run-of-the-mill

stuff, but suggestions that broaden one's horizon and get the user in touch with all the beautiful things the library has to offer." (DOK 2009)

A very successful reinvention of the idea of a public library in a former supermarket building, DOK has been identified as 'The Best Library in the Netherlands'. Public areas are on the ground level and first floor with smaller second floor above for library offices. Original structure of columns and cut edges of slabs left exposed. Large glass roof over central staircase and open reading area provides lots of natural light. Funky furniture and effective signage including wording on floor at bottom of central staircase to draw attention to last step.



**Figure 21      The new Amsterdam City Library**

The new Amsterdam City Library has drawn on the design concepts but not the underlying ideas. Located majestically on Amsterdam Harbour, the new Library is a fitting successor to the great city libraries of the past such as the New York Public Library. But, for all its fine finishes, ingenuity and wonderful spaces, it is more conventional than DOK or the recent Bibliotheek Permeke in Antwerp. The latter has created most successfully a vibrant place for interaction and study in a former garage in a depressed area in the centre of the city of Antwerp.

### Academic libraries

Among academic libraries, a growing trend over nearly the last two decades has been to create 'learning commons', open and often large areas which are equipped for computer access and interaction among library users. The first, dubbed an 'information commons', was established at the Thomas and Dorothy Leavey Library at the University of Southern California. The Library claims to provide "a state-of-the-art learning environment for students and faculty" and offers reference and



computing help 24 hours a day in the Information Commons during semester<sup>19</sup>. That model was, and continues to be, largely a large scale and well supported computer facility. However, the idea was further developed, notably at the University of British Columbia, and is now being widely implemented in academic libraries in many countries.



**Figure 22** Bibliotheek Permeke, Antwerp

Several variations have emerged extending from the largely computer oriented information commons to stand alone 'learning commons' to models integrated into the academic library. The version at the University of Auckland is a standalone model across the road from the central university library and adjoining student services, food outlets and shops. UTS Library has implemented a fully integrated model which extends from level to level throughout the two libraries with changes of form to encourage greater interaction among users in some areas and more concentrated personal study in others. Murdoch University Library has perhaps the most successful version: it has repurposed a lower ground level but connected it via a ramp and garden to integrate into the Library and café.

All of these versions of the learning commons are premised on the understanding that the academic library is no longer simply a place for consultation and cogitation but has become a place for interaction. That is a profound change which reflects both societal and pedagogical change. The Library of the Future will be a place for all three behaviours and will be the common place for learning within universities, the learning commons.

This trend towards interaction has been most daringly manifested at the ROLEX Learning Centre (Figure 24) which is nearing completion at the École polytechnique fédérale de Lausanne (EPFL) in

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<sup>19</sup> Thomas and Dorothy Leavey Library, University of Southern California, <http://www.usc.edu/libraries/locations/leavey> accessed 20 February 2010.

Switzerland. Designed by Sanaa (Kazuyo Sejima and Ryue Nishizawa), it is a rippling three level edifice which aims to the 'library of the future' [la bibliothèque du futur].



**Figure 23** Learning commons at Murdoch University, Perth

According to Chief Librarian David Aymonin, the ROLEX Learning Centre will be a knowledge hub for interaction across the EPFL community where the researchers and research students tend to be isolated in their laboratories, 'a place of innovation in the means of access to information', with its resources available 24 hours a day thanks to RFID (Radio Frequency Identification) chips. Aymonin explains (EPFL 2006) that libraries:

"have become places of exchange, places where generations cross, where there are cultural activities. A library isn't merely a place of consultation but is truly a working space. The student finds modelling, support, exchanges with other students and librarians. They can shelter in the crowd. And they can stumble upon information, publications, services which they haven't imagined. One can also find that for which one hasn't searched."



**Figure 24** ROLEX Learning Centre



## Research and investigations process: the compendium

In 2009, UTS Library began to create an online compendium of exemplars to inform the design of the Library of the Future, involve Library staff and provide a basis for engagement with the university community. Information Technology Services staff in the UTS Library created a system which would enable images of interest to be sorted by location and theme for display on a digital wall and given ratings by viewers.

More than two hundred exemplars of design, sustainability and many other themes have already been added. Many come from libraries and feature aspects of library design, furnishings and services of interest. But others come from commercial and other contexts and illustrate alternative solutions to issues of interest in the design of the Library of the Future.

During 2010, the compendium will be made available to the university community to stimulate interest and discussion. Viewers will be able to rate ideas and add comments which will help shape the brief to be developed for the architects of the new Library.



**Figure 25**      **La Vallée Village, Val d'Europe, Paris**

## Looking beyond libraries

The research summarised in this report and the investigations recorded in the Library of the Future compendium have both extended well beyond libraries to examine other contemporary environments in which people interact. They have included shopping malls, 'concept stores', airport terminals, offices and public spaces. Examination of those facilities and environments has informed thinking about the use of space, presentation of collections, configuration of services, signage, traffic flows, client management, maintenance of security, enhancement of ecological sustainability and many other aspects of the new Library.

Some marked trends are evident in the design of recent public spaces and retail environments:

- **Delight** – with high quality finishes, appropriate lighting, etc
- **Open** – up the services and facilitate navigation
- **Focus** – sparseness in place of excess
- **Serve** – provide ready and **generous** service

A key element of applying those trends effectively is to achieve authenticity. One of the characteristics of traditional libraries which has ensured their longevity is their authenticity. The New York Public Library is more than the lions which guard its entrance on Fifth Avenue: it is authentically a place of knowledge. In contrast, many retail environments, such as that depicted in Figure 25, are decidedly inauthentic (in that case by copying the facades of the village of Bercy to grace a ‘village’ of outlet stores). To ensure its relevance and longevity, **the Library of the Future must develop a new authenticity** which will be recognised by its clients.

Particularly instructive was a visit to the recently opened underground shopping hall connected to the below ground entrance to the Louvre Museum in Paris. Two ‘anchor tenants’ draw visitors past the boutiques, museum shops and eating places which line the shopping hall. They are a Virgin Mega Store (Figure 26) and an Apple Store (Figure 27). Despite its recent construction, the former adopts the same design and business model as older Virgin Mega Stores: it seeks to attract visitors and purchasers by displaying a cornucopia of product, of DVDs, CDs, books, devices. In contrast, the Apple Store is spare with virtually no ‘product’ on display, just a couple of walls of accessories at the extremity of the Store. Instead of enticing by presenting product, the Apple Store entices by offering experience. The experience offered is that of trying the many computers available on benches and tables in the Store and of being guided by the assistants or seeking advice and encouragement at the “Genius Bar”.



**Figure 26** Virgin Mega Store, Carrousel du Louvre, Paris

The contrast between these two business models is stark. The Virgin Mega Store which measures its worth by the amount of stock available is similar to the traditional library measuring itself by size of collection. But the Internet has been a 'game changer': information is now available in quantity, the experience of finding and making use of relevant information is the goal. Operating in the same global information environment as its commercial counterparts, the Library of the Future will be focussed on experience. For academic libraries, the experience is that of learning with guidance and training. Information must still be acquired but the Library doesn't have to own the information objects, it just has to offer routes and navigational assistance.

## Developing design principles

The design of the new Library will be in the hands of architects appointed by the University who will interact with the University's Project Control Group and with groups of stakeholders, especially students and academic staff across the University's disciplines.

The overall shape and size of the new Library has been largely predetermined by the University's decision to strip back Building 2 to columns and slabs rather than start afresh. Its configuration will be further shaped by an accommodation schedule which will specify the number, types and spaces to be included in the new Library and their characteristics. Many parameters for design and use of materials will be established through the requirement to conform to the UTS Design Guidelines.



**Figure 27** Apple Store, Carrousel du Louvre, Paris

However, the construction of a Library of the Future is more than the aggregation of design guidelines, accommodation schedule and pre-existing structure. If it is to truly merit the label of Library of the Future and have some prospect of retaining that leadership, the new Library will reflect ideas about the use of knowledge, research and learning which will endure.

This report explores many of those ideas and possibilities which will be distilled in the next chapter into design principles which are intended to foster the most effective interaction between architects and the University community. The principles do not specify the physical shape or specific elements of the new Library but seek to express the ideas which the building should articulate in both its design and operation.

The expression of ideas to inform the design of libraries is not novel. Ideas have powerfully directed the design of the innovative ROLEX Learning Centre, mentioned above. And, at KU Leuven in Belgium, for example, the design guidelines were summarised thus (Dekeyser 2000):

**Clusters:** In order to prevent the anonymity of a very large library, the new building should be divided in a number of large clusters, each consisting of a number of related subjects with a specialised librarian to staff it: a didactic cluster with books for undergraduates and general reference works, biosciences (agronomy, botany and zoology), mathematics, computer sciences, electronic and mechanical engineering, chemistry, physics, astronomy, material sciences, geology, architecture, construction, geography.

**Disposition of the collection:** Since the total budget for the construction will certainly be limited, the idea was raised to divide the collection in layers with decreasing accessibility. The most recent works should be accessible in open stack. Less recent books and journals should be stored in a compact system. Even older documents may be stored in a deposit library. The idea would be to work with a continuous flow system: when more new books are bought, this should be compensated by a shift of some older works from open stack to the compact system, and from the compact to the deposit.

**Further requirements:** An extension of the total number of seats; an instruction room with multimedia applications; Differentiation and specialisation of staff; late opening hours and weekend service.

Some of these, especially the 'further requirements' include elements such as the need for more seats which should be included in the accommodation schedule. But the concepts of 'clusters' and 'disposition of the collection' represent principles which shape the design of the library.



### 3 Activities & Outcomes

Great libraries have always been places for research and study. For a thousand years and more scholars travelled to the great monastic and university libraries in Europe and their counterparts in the Arabic, Chinese and other cultures. More recently the libraries of major research institutes have beckoned. The purpose of such visits was and is not solely to access the collections held by the libraries – much of which could be done remotely via interlibrary loan and digitally today – but also to engage with the scholarly enterprise surrounding the library. Although much has changed in regard to scholarly information, we can confidently assert that the academic library of the future will continue to form a knowledge hub for research and study. It will continue to support researchers and learners, teachers and inquirers some of whom will visit the Library's premises and others who will interact only with the Library's digital spaces.

But the continuing role of the academic library is not immutable. The academic library of the future is a place for consultation, cogitation and *interaction*. This is a significant departure from the history of libraries which has been foreshadowed in the development of learning commons in academic libraries and community spaces in public libraries. In many ways, the Library is returning to the model of the Great Library of Alexandria and later monastic libraries as a place for interaction between scholars rather than largely a repository for publications. The shift to digital scholarly publications and the emergent trend to limit on site open access collections have freed academic libraries from the constraints previously imposed by the need to accommodate large collections of publications.



**Figure 28** Behaviours to be supported by the Knowledge Hub

Thus the academic library of the future will be a [knowledge hub](#) which will coexist in both physical and digital realms to support consultation, cogitation and interaction. It will facilitate collaboration, reaching out through mobile technologies to enable interaction and discourse. In its building design and digital architecture, it will facilitate sharing – of knowledge and resources and facilities. But it will continue to be a place of consultation and cogitation.

Despite their inherent value, in the university context these activities are not ends in themselves. They are central to the key outcomes desired at the university: learning, research, scholarship and engagement. The Library of the Future must play its part in securing those outcomes.

## 3.1 Learning

As noted above, the Library of the Future is a place for consultation, cogitation and interaction. The first two behaviours, consultation and cogitation, have been associated with libraries since their inception. The collection-centeredness of libraries arises from the aim to facilitate the consultation of related materials by creating interrelated, ‘well formed’ collections of documentation in the disciplines and areas of interest supported by each library. The London Library, for example, prides itself on its collection of more than a million books almost all on open access to enable ready consultation. But the advent of the Web has dramatically and rapidly changed the need to concentrate since dispersed resources are now consulted ‘on the move’ from many locations. Many valuable resources are still concentrated in libraries and collections of books, journals, manuscripts and other physical resources are still central to study in many disciplines but they can be discovered and, to a growing extent, used via the Web together with the ever growing array of digital resources.

*Delivering a ‘cachet’ to UTS staff and students, and valued partners, can be achieved by reserving access to some facilities and services with a higher standard of fitout.*

Cogitation has also become mobile and is no longer principally associated with book lined studies and libraries. However, the ‘hush’ of a silent reading room in a library is still desired by many library users as was confirmed in the 2008 survey of UTS students and staff. Students speak of how much more easily they find that they can study when surrounded by others who are studying. They do not always demand silence, often preferring to be able to make quiet comments or ask questions of others, but at times wish for absolute silence without even the click of keys on laptops.

These two behaviours have been joined by interaction. Reflecting the adoption of active learning pedagogical models and societal changes, many students prefer to study in a social context with friends or colleagues. This ‘social learning’ can be extremely vibrant and noisy but is also productive. Students who at first sight might appear to be simply chatting with others are generally working while interacting. They are often ‘multitasking’: interacting while reading, surfing the Web, listening to an mp3 or working on an assignment. These behaviours, long observed among teenagers at home, have now become a characteristic style of library use along with the more traditional quiet interaction and silent, lone study. Individuals may have a characteristic style but most will adopt different styles at different times, depending on their specific goals at those times.



The Library of the Future needs to support all of these behaviours and styles through clever design and management of physical and digital spaces, services and resources. To do this effectively, it must offer a secure environment. It needs to be a place where students will feel safe from theft or other threat but also a place in which they feel secure to learn through ready access to resources and facilities coupled with strong, reliable and non judgemental support.

## 3.2 Research & Scholarship

The dramatic changes to research practice which were discussed at some length in section 2.3 have many implications for the Library of the Future. Those implications will change the way in which research information resources are managed, the services which are provided to researchers and research students and the facilities which are made available for them. The Library of the Future needs to build upon the creation of the Scholars' Centre in the Blake Library, UTSeScholarship and a range of other programs to support research and research education. It should draw on initiatives elsewhere, such as the British Library's Research Information Centre, to create an even more embedded model of research support. That model will draw upon the Library's poles of expertise in the disciplines studied and researched at UTS, expertise in metadata and other relevant areas, the eScholarship infrastructure, and new facilities to be constructed in the Library of the Future. That endeavour will create a new university research information management environment through which the Library will work with the Research and Innovation Office to support researchers throughout the research cycle.



**Figure 29**      **Scholars' Centre at the University of Western Australia**

Bearing in mind the view expressed by academics in response to the 2008 survey that the Library should be 'more scholarly', it will be important for the Library of the Future to express its scholarly orientation in its fabric and fittings as well as via its services. It might, for instance, include a Scholars' Centre designed for postgraduate research students and another for academic and

research staff with the purpose of both signalled by the display of rare books, classic reference works and bound theses. Rather than a high quality but passive space as is the current Scholars' Centre in the Blake Library, these new facilities could draw on experiences such as those with the now rather old fashioned Scholars' Centre at the University of Western Australia. That Centre provides carrels for students (principally humanities) during their candidature, digitisation services and research support services. The model could be updated to take advantage of contemporary technological possibilities – especially mobile, social, data management and visualisation technologies – to operate within both digital and physical realms.

### 3.3 Engagement

Engagement with both the internal university community and the broader external community is a characteristic of modern universities. For a university like UTS with its pragmatic and professional focus, engagement is particularly oriented towards involvement with and support for the professions, industry, business and government. The university library plays a part in this engagement. It does it through supporting the extra mural programs of the university and the efforts of faculties to develop closer relationships with potential partners. Of itself, the university library offers direct access to its collections and, to a limited extent, its services as part of the 'community obligation' of the university. Although this has been complicated by the shift from purchasing printed resources to licensing digital resources with concomitant limitations on who can use the resources, UTS Library and others routinely negotiate 'walk in' provisions to enable community access to licensed digital resources. That access is an important element of the 'opening' of the university to the broader community.

*The design of the Library of the Future will be essentially open and welcoming to the public with subtle but effective security.*

By providing access to those resources and limited use of facilities and services, the university library takes on the nature of 'public space' while remaining university owned and controlled space with all the powers to regulate access and corresponding responsibilities entailed in that. In recent years, those responsibilities have grown more complex as Mitchell (2003) noted in tracing the history of the use and regulation of public space in the United States. He identifies a particular concern with the privatisation of public space through the creation of shopping malls and the potential inhibition of public space through increased surveillance and security as urged by many in the wake of terrorist attacks such as the September 11, 2001 events in New York and Washington (and one could observe similar calls after other threats and attacks including London and Madrid). Mitchell counters such demands by emphasising the security inherent in shared public spaces and quotes Anthony Vidler in the New York Times soon after the September 11 attacks: "The street as a site of interaction, encounter and the support of strangers for each other; the square as a place of gathering and vigil; the corner store as a communicator of information and interchange. These spaces, without romanticism or nostalgia, still define an urban culture, one that resists all effort to 'secure' it out of existence." There is a lesson in this for the Library of the Future: to render it a shared space which will be 'owned' and 'protected' by the community.

As was noted previously, the location for the Library of the Future creates several major challenges:

- at a basic level, to operate an environment in which users of the Library feel secure from theft, attack or interference;
- to manage demand from students of other institutions so that their usage does not impinge on usage by UTS students or those welcomed through reciprocal or partnership arrangements;
- to provide UTS staff and students, and valued partners, with a sense that they are recognised to be 'special' by UTS through accessing facilities and services which are not 'open to anyone'.

Since engagement is critically important to the University, the design of the Library of the Future needs to be essentially open and welcoming to the public with subtle but effective security. But it also needs to deliver specific recognition – a 'cachet' – to UTS staff and students, and valued partners. That cachet can be achieved by reserving access to some facilities and services for their use and by providing a higher standard of fitout to those areas within the building and their digital counterparts.



## 4 Design principles

In accordance with UTS practice, the new Library will be designed by architects who will be guided by a Project Control Group and will seek information from students, academic staff and other stakeholders. The overall shape and size of the new Library has been largely predetermined by the University's decision to strip back Building 2 to columns and slabs rather than start afresh. Its configuration will be further shaped by an accommodation schedule and the UTS Design Guidelines. But to create an enduring Library of the Future, the project will be informed by ideas about the use of knowledge, research and learning which will endure.

Many considerations will need to be addressed in the planning of the Library of the Future and, in particular, the design of the building to house it. Those considerations have been canvassed in this report and include the key characteristics mentioned earlier in relation to the Hewlett-Packard Laboratory in Bristol: efficiency, liveability, sociability and sustainability. Those qualities will be achieved by addressing factors such as those which drive the trends listed by Sens (2009):

1. Envision the library as place
2. Invite students and other stakeholders to the table
3. See that technology drives the bus
4. Make collaboration a must
5. Plan for change
6. Use the library to attract and retain top students
7. Optimize spaces between spaces
8. Consolidate emerging specialty spaces
9. Take advantage of the commons
10. Rethink library programming
11. Design for environmental sustainability
12. Get creative with funding

Many of these 'trends' – such as 2, 6 and 12 – relate more to process but others inform the character of the Library of the Future and provide guidelines for its development. They and the ideas and possibilities explored in this report can be distilled into the following five design principles to guide the creation of the new Library.

The principles are not intended to specify the physical shape or specific elements of the new Library but seek to express the ideas which the Library of the Future should articulate in both its design and operation. The principles apply to the building to be constructed on the skeleton of Building 2, the services to be offered both in that physical environment and digitally, and the resources, physical and digital, which will nourish learning, teaching, research and scholarship.

The five principles summarise the characteristics of the Library of the Future and, to an increasing degree, differentiate it from previous models:

## Sustainability

The Library of the Future must be sustainable in the triple bottom line understanding of that term. In other words, it needs to be environmentally, socially and economically sustainable. This principle puts a heavy load on its design but also provides exciting opportunities. Its achievement demands close attention to the nexus between physical and digital facilities, resources and services to minimise environmental impact and operational costs while enhancing social benefits. Flexibility and adaptability are at the cores of sustainability. If the library – in its structure and fabric, resources and services – is not easily adaptable, then it will not continue to function efficiently and effectively decades into the future as it must like its predecessors.



**Figure 30**      **Library of the Future Design Principles**

## Openness

Three major aspects of openness have been identified in the research that informed this report. The first lies in open access to knowledge through unrestricted access to scholarly information. By actively supporting the Open Access Movement, UTS Library has both provided practical assistance and made a statement about the importance of this aspect. However, the negotiation of 'walk in' provisions for licensed digital information and continued efforts to make scholarly publications more readily available help advance it. The second aspect is support for open interaction and discourse which UTS Library enables through the provision of suitable physical and digital spaces and by promoting public programs such as the decade old Markets Forums. And the third aspect is that of providing an environment which all can enter and find secure: this has been a major challenge in the current premises in the Blake Library due to the high incidence of personal theft in that location.



## Interaction

Interaction lies at the heart of the conception of the Library of the Future and is a major point of differentiation from previous library models. It is the counterpart to consultation and cogitation and the key to engagement. But, in the academic context, it is not simply a matter of providing lounge and learning spaces, cafes and halls where people can meet and chat. It is a question of designing and carefully managing physical and digital spaces which foster effective interaction to promote learning. Interactivity has been taken to the heart of the new shops which Apple has created in the great cities of the world: they emphasise experience over purchasing, interaction over transaction (Figure 26).

## Learning

Learning, naturally, lies at the heart of the academic library of the future. It must be a place of learning in the fullest senses of that expression. It will be a place in which researchers and students encounter knowledge, study and discourse to develop their own understanding and create new knowledge. For students, it will be a place in which they will feel supported and secure to learn, especially if they should be timid learners. Although learning has always been a core purpose of libraries, the Library of the Future is more engaged with learning as a process of discovery, thinking and understanding than providing primarily a resource on which learners can draw. The role of the university library as a place of learning in many ways exemplifies the centrality of learning to the university. Thus the library operates as a window into the university to display its core activities – suggesting that the most effective library in the future will be a ‘big glass box’ like the DOC Library Concept Center in Delft (Figure 20).

## Scholarship

The academic library of the future will unquestionably be a place of scholarship, a place in which scholarship is evident in the fabric of the environment as well as in the resources and services which are available and the investigations and interactions of the scholars who visit it, physically and digitally. Again, there has long been a close nexus between academic and research libraries and scholarship but the Library of the Future will take the library beyond being a place of encounter with knowledge to becoming a place of engagement with knowledge through its active support for research and research education. The quality of ‘scholarship’ is exemplified by the iconic King’s Library suspended over the monumental stairs in the British Library (Figure 18).

From these principles will emerge a library which will draw upon those which have gone before but will achieve its own distinctiveness and will be prepared to take on the changes and challenges of the future. This will not be the library of the future nor merely a library of the future but will be a library for futures, a library which can adapt to evolving modes of scholarship, research, teaching and learning and the changing character and priorities of UTS over the decades to come.

## 4.1 Building

As was noted above, the design of the building to house the new University Library at UTS will be prepared by architects in consultation with a Project Control Group, stakeholders and other consultants. The overall shape and size of the new Library has been largely predetermined and its configuration will be specified in an accommodation schedule and in conformance with the UTS Design Guidelines.

For the purposes of this report and without pre-empting the accommodation schedule, Figure 31 indicates the major elements to be included in the Library of the Future in a schematic diagram. It does not indicate the strength of the relationships between the elements nor the important service and administration facilities which will underpin them. It serves, however, to show how the activities discussed in Chapter 3 begin to come together, in both digital and physical forms, to create a new kind of academic library, a place for interaction with people and with knowledge.



**Figure 31** A schematic diagram of major elements of the Library of the Future

The conjunction of physical expression of those elements will be guided by the principles identified in this chapter. They will operate at a high level to shape the ambience and character of the building

and hence the image of the Library of the Future for its users, the UTS community, other students and researchers and the people of Sydney city.

Many pragmatic and conceptual issues will be addressed in applying the principles to the design of the building. The issues which will be fully explored during the design phase but some indication of their scope is appropriate here. Briefly, they will include:

- **Sustainability** – minimising the environmental impact and maximising service and economic sustainability through well considered building design
- **Openness** – ‘open to all’ and ‘open all hours’, at least digitally, but secure and with particular value to the UTS community
- **Interaction** – a place of encounter in which students and academics can meet and share ideas in congenial surroundings
- **Learning** – an environment which fosters learning through both quiet study and vibrant interaction in well designed and appropriately furnished spaces
- **Scholarship** – a visible manifestation of and supportive environment for scholarly pursuits at UTS

## 4.2 Resources

In conjunction with the planning for the new Library, UTS:Library is extending its reconsideration of both the nature of the resources it presents to support scholarship, research and learning at UTS and the ways in which they will be presented. The Sustainable Collection Model, presented in Chapter 2, has become a powerful tool for understanding and identifying solutions to the management challenges in this core but rapidly changing element of academic pursuits.

The design principles shape the Library’s responses to the questions relating to scholarly resources in similar fashion to those relating to physical accommodation:

- **Sustainability** – delivering scholarly information to enable research and study with the smallest possible environmental impact and maximum economic sustainability
- **Openness** – ‘open to all’ through open access as far as licences can be negotiated and with collections ‘open all hours’, at least digitally, but with particular value to the UTS community
- **Interaction** – a place of encounter with knowledge and debate enhanced by scholarly information of vibrant public programs
- **Learning** – an information rich environment to foster learning and research, an environment which is situated within the broad biblio/blogosphere to support emerging modes of learning and research
- **Scholarship** – a place of 21st century scholarship enabled by the provision of effective tools for discovery, analysis, visualisation and dissemination.

## 4.3 Services

Coupled with the focus on renewing the UTS:Library approach to the provision of scholarly resources is a thorough review and repositioning of services to the UTS community and beyond. Again, that reconsideration is guided by the design principles:

- **Sustainability** – facilitating research and study efficiently to maximise economic sustainability and well targeted to be as effective as possible
- **Openness** – services ‘open to all’ and ‘open all hours’, at least digitally, but with a particular cachet for the UTS community
- **Interaction** – since 2007, UTS:Library has been exploring and then implementing Web 2.0 services; it will continue to adopt new services paradigms in order to promote interaction and discourse in aid of learning and research
- **Learning** – a crucial role for UTS:Library lies in capability development and point of need support for learning
- **Scholarship** – just in time support and capacity enhancement for 21st century scholarship.

## 5 Conclusion

The Library of the Future project offers UTS a tremendous opportunity to reinvent the academic library for the benefit of current and future students, teachers and researchers at UTS and to stimulate thinking about libraries into the Twenty-first Century.

The strong history of innovation and reinvention of scholarly library and information services by UTS:Library provides a solid foundation for further 'pushing the envelope' to imagine the Library of the Future and bring it into being by 2015. In some respects, that Library will – and must – be familiar as it continues to support current modes of study and research. But it will be different in its orientation and capacity to evolve to facilitate and enhance future approaches. It will not be unique in seeking to define the future but it will be on the leading edge of those developments. This report confirms that UTS has the wherewithal and capabilities to take that position of leadership.





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## Appendix A Libraries visited during development leave

### University Libraries (Bibliothèques Universitaires - BU)

#### France

1.



##### **Arras - Université d'Artois**

A small university library (4000 sqm) in a regional university, designed by Rousse. Mainly distinctive for its use of natural light and well designed interior navigation.

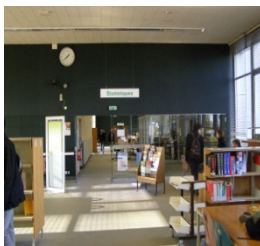
2.



##### **Dijon - Université de Bourgogne- BU Droit-lettres**

Dramatic reconfiguration and extension of the law library: with a new glass façade and new entrance via a suspended slab to a three level building on the 1950s campus; designed by Durand, Menard, Thibault; completed 1998. Very successful opening up and reinvention of a conventional library building. Much more open than most visited in France. Includes some glass fronted discussion rooms and silent postgraduate rooms. Small internal palm garden on lowest level. <http://scd.u-bourgogne.fr/Bibliotheques/default.htm>

3.



##### **Dijon - Université de Bourgogne - BU sciences et économie**

A 1950s building which has been refreshed at low cost by judicious use of paint. Houses sciences, economics, business and the médiathèque including French and foreign literature. <http://scd.u-bourgogne.fr/Bibliotheques/default.htm>

4.



##### **Dijon - Université de Bourgogne - Bibliothèque d'IUT**

A small library for the IUT (Institut universitaire de technologie) located on the campus of the uB. Slick modern exterior but conventional inside. <http://iutdijon.u-bourgogne.fr/www/>

5.



##### **Lille - Université de Lille I - BU**

A 1970s circular building located at the centre of the campus on a mound with collection storage beneath. It continues to be a landmark building but appears to be internally inflexible because of the dominance of its external form over the enclosed functions.

6.



### **Lyon – École normale supérieure des sciences de l’information et des bibliothèques**

The French national library school, enssib has its own building located on a former racetrack adjoining the campus of the Université de Lyon I. Enssib’s library lies within the building on two levels with an internal staircase. It has a single service desk and employs RFID based self check out.

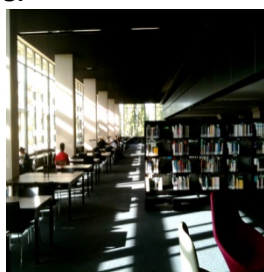
7.



### **Lyon – Institut nationale des sciences appliqués**

A dramatic building for the national applied science institute in Lyon, this library is modern and well presented with effective use of technology.

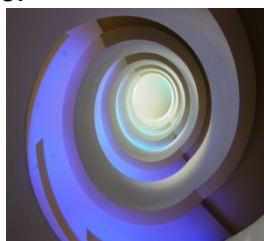
8.



### **Lyon – Université de Lyon I – BU Sciences La Doua**

Recently opened, this university library stands on a mound near the centre of the campus, close to eating facilities and the tram line. It uses daylight very effectively to create welcoming study spaces. New furnishings contrast black with bright pinks and yellows.

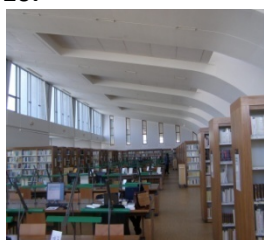
9.



### **Lyon – Université de Lyon II – BU Chevreul**

Recently constructed, this university library replaced an older building which had been destroyed by fire. It is located on a tight urban site, one block back from the River Rhone in the middle of Lyon. Study areas on upper levels have vistas over older buildings in the district. The building is glass clad with effective use of lighting, especially that used to counterpoint the circular staircase.

10.



### **Lyon – Université de Lyon II & III – BU Denis Diderot**

Recently completed, this multi university library is located in an urban renewal zone at the southern edge of Lyon. The building is beautifully designed with large reading rooms on each level featuring natural light and rich timber finishes on furniture and shelving. Each reading room has a staffed reference desk. Some leaks were evident in the entrance foyer.

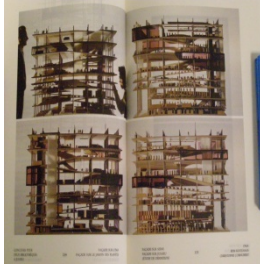
11.



### **Lyon – Université de Lyon III – BU Jean Moulin**

Located within the former premises of the Tobacco Manufacture, this university library is partly located in a purpose designed concrete building in central courtyard but extends into one of the heritage wings. Those wings feature some attractive industrial vestiges. The modern library is unexceptional.

12.



### Paris – BU des sciences de l'univers

Still under construction, this multi university library will bring together the collections of a number of physical science libraries. It is located at Jussieu on the left bank in Paris on a congested site together with Université de Paris VI Pierre et Marie Curie.

13.



### Paris – Institut national d'histoire de l'art

The Galerie Colbert was reconstructed for the Bibliothèque nationale de France in 1982. Following the removal of the BnF to its new location, it was handed over to the national institute of the history of art (INHA) and converted by the architects Dominique Pinon and Pascale Kaparis. They created a larger linking foyer and a new staircase, letting daylight in from above.

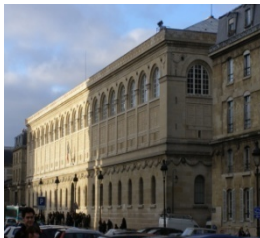
14.



### Paris – BU Sainte Barbe

A new multi university library for undergraduates at the Sorbonne and other universities, located in the heart of the Latin Quarter close to the Pantheon. The building has been sensitively converted from a nineteenth century building on the site of an ancient college. Very effective use of daylight and building features including an extraordinary studio with polychrome decoration. Due to demand exceeding available spaces, an automatic counter is used to control the number entering the library.

15.



### Paris – BU Sainte G  nevi  ve

One of the great academic libraries of Paris, the Biblioth  que de Sainte G  nevi  ve features a magnificent steel framed, rectangular reading room illuminated by skylights. The entrance opposite the Pantheon is at street level, below a frieze of the names of great writers and artists. One enters from the dark registration area up a magnificent staircase into the light of knowledge in the reading room. Due to high demand, students queue outside to gain access.

16.



### Paris – Universit   de Paris IV – Clignancourt

A small and forgettable library in an older building at the northern edge of Paris near the P  riph  rique. Nothing of interest.

17.



### Paris – Universit   de Paris Sorbonne – BU Cujas (Droit)

The central law library for the Sorbonne, across a side street from the Law Faculty and opposite the Pantheon. Not permitted to take photographs inside. The ground floor is dominated by a large information commons with perhaps 100 computers. It was very busy and appears to be inadequate in size. Laptops and internet connections are not permitted because of fears of viruses or attacks. A highly controlled environment.



18.



**Paris – Université de Paris VI Pierre et Marie Curie – BU Jussieu**

A major science based university in central Paris, University Paris 6 is undertaking major renovations of its 1960s complex on the left bank. The university library is conventional in nature.

19.



**Paris – Université de Paris VII – BU Grands Moulins**

A most successful conversion of a former mill building into a wonderful new library preserving many of the industrial features of the original building. Designed by Rudy Ricciotti, for the recast University Paris 7, it provided the central library the University had lacked. It extends across 5 public floors with 1420 seats: individual work places, large tables and group rooms. Students can work overlooking the Seine or the central courtyard, on a passageway or among the books. <http://biblio-centrale.univ-paris-diderot.fr>

20.



**Paris – Université de Paris VIII – BU Saint Denis**

Located strategically at a major transport hub, the University Paris 8 is engaging vigorously with the somewhat depressed 'banlieu' (suburban region) in which it is located. The Library is in turn located at the hub of the university where students enter from the Metro and buses. This and thoughtful design by Pierre Riboulet has made it a most effective modern university library.

[http://www.pierrerioulet.org/apprendre/apprendre\\_index.htm](http://www.pierrerioulet.org/apprendre/apprendre_index.htm)

21.



**Paris – Université de Paris XII – BU Créteil, Val de Marne**

Another Paris university which has relocated to a south eastern banlieu, Paris 12 has a new campus extending from the railway station through the apartment blocks to provide an active core to the new growth area. It prides itself on its relations with the community. The central library is octagonal with a small museum area in the central core which displays relics of the WWI Battle of the Marne. Unfortunately this removes most of the daylight from the reading rooms which are somewhat gloomy and enclosed.

22.



**Paris – Université de Paris XII – BU Droit, Créteil**

The Law Library of University Paris 12 is located on a major avenue near the shopping centre. It is a striking building with the Library spread over floors 1 and 2 (behind glass in photo) providing awkward entrance for the disabled. The only way to get from one level 1 to 2 are a very small and very slow lift or to go out to the foyer and up the stairs. However, the spaces are bright with natural daylight and light colours. There is a service desk and mezzanine floor on both levels.

23.



**Paris – Université de Paris XIII, Leonard de Vinci – BU Bobigny**

A new campus for University Paris 13 (health, medicine, human biology) has taken over a former industrial site in a north eastern banlieu near the major Islamic hospital. A very fine conversion of a factory building provides teaching and faculty spaces. Unfortunately, the Library has been located in a modern building on the edge of the campus. It appears to be peripheral to the University. [http://www-smbh.univ-paris13.fr/smbh/biblio/basebiblio\\_.html](http://www-smbh.univ-paris13.fr/smbh/biblio/basebiblio_.html)

24.

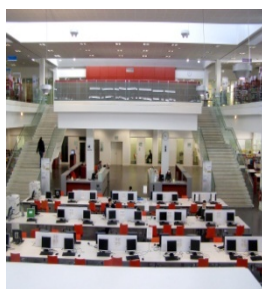


#### Paris – Université de Cergy-Pontoise

With several campuses in the leafy and affluent north western and western banlieux of Paris, this university contrasts with those in the centre of Paris and in the depressed banlieux on the other sides. The libraries are small and not distinctive. Photo from website

<http://www.u-cergy.fr/rubrique1297.html>

25.



#### Reims – Université de Reims Champagne-Ardenne – BU Robert Sorbon (Droit-lettres)

This regional university is located in new growth areas outside Reims although it grew from older faculties which had been located in the centre. Recently opened, the striking new Law Library and central library administration replaced a terrible old building. It is the only 'green' university library I visited in France, featuring energy saving, water harvesting and environmental consciousness. Although not enormous, the Library makes good use of daylight from a skylight over the learning commons with a surrounding mezzanine for the collections. It has only one reference desk unlike the majority of substantial university Libraries in France.

<http://scdurca.univ-reims.fr/exl-php/cadcgp.php>

### Belgium

26.



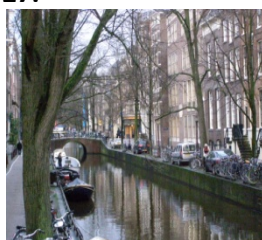
#### Antwerp – Universiteit Antwerpen – university library

Recently opened central library, the modern building is cleverly placed and interconnected with a 17<sup>th</sup> Century courtyard housing parts of the University. It is a very stylish and modern university library with varied spaces for silent and quiet study and some group study rooms. Interesting use of shapes to make the environment more visually interesting.

<http://www.ua.ac.be>

### Netherlands

27.

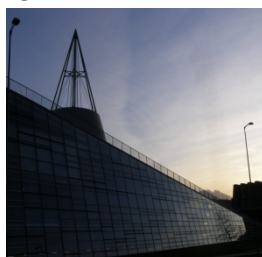


#### Amsterdam – University of Amsterdam – University Library

Squeezed into narrow streets and canals near the Spui, the University of Amsterdam has eight libraries including a new learning centre in the Faculty of Science building.

<http://cf.uba.uva.nl/en/index.html>

28.



#### Delft – Delft Technical University

One of the most **striking library buildings** in the world, TU Delft is a glass wedge with grass on the top slope and a cone penetrating through it to make a landmark. The section of the cone inside the building houses 4 (?) levels of study spaces, less popular than the **large glass sided reading room** at the side of the wedge. Designed by Mecanoo and constructed in 1997, it has developed as a **highly digital** library with a very successful repository. It is one of the academic libraries which best joins physical and digital realms. The open access collection is presented as a **wall of books** at the high end of the wedge.

<http://www.library.tudelft.nl/ws/index.htm>

<http://www.galinsky.com/buildings/delftuniversitylibrary/index.htm>

## Switzerland

29.



### Lausanne – École polytechnique fédérale de Lausanne – ROLEX Learning Centre

The arresting ROLEX Learning Centre is being constructed on the EPFL site near Lac Lemman on the outskirts of Lausanne. Designed by Sanaa (Kazuyo Sejima and Ryue Nishizawa), it is a rippling three level edifice which aims to be the '**library of the future**': a high place of **knowledge** and 'a place of **innovation** in the means of access to information', an 'enhanced library' as the twenty-first century person is enhanced by technology. It will not be characterised by silence and queuing at desks but its resources will be available **24 hours** a day thanks to **RFID** (Radio Frequency Identification) chips.

<http://learningcenter.epfl.ch/webdav/site/learningcenter/shared/learning-center-06-09-2006.pdf>

The striking building will house a restaurant and cultural spaces as well as the Library and is intended to provide a knowledge hub for interaction across the EPFL community where the researchers and research students tend to be isolated in their laboratories. <http://learningcenter.epfl.ch>

30.



### Lausanne – Université de Lausanne – BU

Located on the main campus of the University, the central library - Bibliothèque cantonale et universitaire de Lausanne – is a combined cantonal (public) and university library but is primarily the latter.

The large building features extensive use of timber and was considered to be a '**library of the future**' with the first open access collection in Switzerland when opened in 1982. It is now considered inadequate in both size and design so planning is beginning for a replacement which is currently planned for 2035 but expected to be constructed earlier. The ROLEX Learning Centre at the adjoining EPFL campus provides challenging competition.

<http://www.unil.ch/bcu/page17028.html>

## United Kingdom

31.



### Oxford – University of Oxford – Radcliffe Science Library

The Radcliffe Science Library shows a successful linking of two older library buildings by a glass insert. <http://www.ouls.ox.ac.uk/science>

32.



### Oxford – University of Oxford – Bodleian Library

The central library of the University of Oxford, the Bodleian signifies the **great libraries** of the past with imposing sandstone architecture and **great reading rooms**.

<http://www.ouls.ox.ac.uk/docs/historybodleian.pdf>



33.



### Oxford – University of Oxford – Bodleian Law Library

An off-form concrete building, the Bodleian Law Library typifies the libraries built in the 1970s and now looks **dated** externally and has a mean entrance. However, the reading room has been elegantly refurbished. <http://www.ouls.ox.ac.uk/law>

34.



### Oxford – University of Oxford – Radcliffe Camera

The Radcliffe Camera was designed by James Gibbs in the English Palladian style and built in 1737–1749 to house the Radcliffe Science Library. Its dramatic dome is a feature of the landscape of Oxford. The Upper and Lower Camera reading rooms are linked by underground passageways to the Bodleian for the transfer of books for consultation. <http://www.ouls.ox.ac.uk/bodley/library/rooms/lc>; <http://www.ouls.ox.ac.uk/bodley/library/rooms/uc>

35.



### Oxford – University of Oxford – Social Science Library

A modern library building, the Social Science Library has reading areas with bright colours and pleasant outlooks but otherwise conventional.” Use of the Social Science Library continued to increase [266K visits pa] – the SSL is now more than twice as busy as any other Oxford University lending library, and is the busiest reference library outside of the Central Bodleian” [http://www.ssl.ox.ac.uk/AnnualReport\\_200809.pdf](http://www.ssl.ox.ac.uk/AnnualReport_200809.pdf)

## Public Libraries (Bibliothèques Publiques - BP)

### France

36.



### Arras – Médiathèque Palais Saint Vaast

A recently opened médiathèque located within the eighteenth century Palais Saint Vaast. The médiathèque is supported by new blue wall which dramatically extends up three floors through the Palais next to the soaring main **access stairs**. Interesting for the use of **colour** and quirky **furniture**. <http://www.arras.fr/culture/bibliotheques-municipales.html>

37.



### Dijon – BP Patrimoniale et d'étude

Recently opened conversion of a former Jesuit church into the central heritage and research library of Dijon. The church had been deconsecrated during the Revolution, was subsequently used for many purposes and housed the Chamber of Commerce during recent decades. The renovation and conversion has highlighted the gothic apse to create a wonderful space and has provided a contemporary air of **excitement** by using very modern **colourful furnishings**. <http://www.bm-dijon.fr/opacwebaloes/index.aspx?IdPage=96>

38.



### Dijon – Médiathèque Champollion

Stunning suburban médiathèque located on a prominent corner of a main road. The architects have created interesting spaces with odd shaped windows. Heavily used and evidently much liked by clients and staff. It is a **green** building with low water gardens planted and solar treatment of windows using perforated steel covers.

<http://www.bm-dijon.fr/opacwebaloes/index.aspx?IdPage=101> Its aspiration is to be the library of today “a cultural place for students and citizens, thanks to the new information technologies ... a symbol of openness to the world”.

39.



### Lille –BP

A rather industrial looking building set along a narrow street. Nothing inspiring.

40.



### Lyon –2eme arrondissement – BP

A pleasant neighbourhood public library in the bottom of an apartment block. Nicely furnished with effective use of varnished pine beams. Ground floor 320 sqm with 100 sqm mezzanine above.

<http://www.bm-lyon.fr/pratique/bibliotheques/bib2.htm>

41.



### Lyon – 3eme arrondissement – BP Part-Dieu

The central public library of the city of Lyon in an 8 (?) floor building with the top 5 floors forming a ‘silo’ to hold the collections which include many heritage items from the city’s long history. The building is off form concrete with moulded concrete art works which would have been striking when it was new. Now it looks gloomy and old fashioned despite the high ceilings and pleasant proportions of the major reading rooms.

<http://www.bm-lyon.fr/pratique/bibliotheques/bib3Pd.htm>

42.

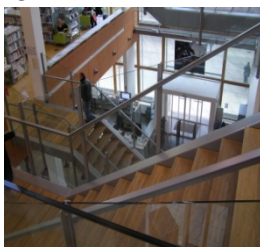


### Lyon – 7eme arrondissement – BP Jean Macé

A very new neighbourhood public library in the bottom of a new apartment block, looking onto an atrium garden. Features great use of natural light and a thoughtful disposition of the collection and reading areas. Although small, it provides a nice variety of spaces for users and interesting furniture. Amusing poem on website “they insulted the ... and dogs but did dare insult the cats”.

<http://www.bm-lyon.fr/pratique/bibliotheques/bib3.htm>

43.



### Lyon – 8eme arrondissement – Médiathèque du Bachot

A grand new médiathèque in Lyon, the building sits dramatically on a paved peninsula pointing into a square, with a water feature at the end. The building is on staggered levels, linked by open stairs which let in daylight and provide the warmth of timber. That style is complemented by very modern shelving and furniture and effective lighting. See website for elevation and video

<http://www.bm-lyon.fr/pratique/bibliotheques/bib8.htm>

44.



#### **Lyon – 9eme arrondissement – Médiathèque de Vaise**

Strikingly located on the major square of the 9th arrondissement of Lyon, this médiathèque is fine modern design, making excellent use of a glass façade with rendered walls on the busy side streets. Not as effective as Bachut in the 8<sup>th</sup>, it is nevertheless a fine example of a modern French médiathèque. The substantial collection of 70K items includes a specialisation in theatre and performing arts.

<http://www.bm-lyon.fr/pratique/bibliotheques/bib9Vaise.htm>

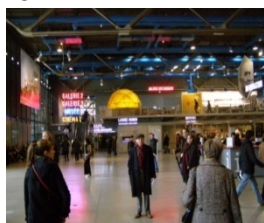
45.



#### **Paris – Bibliothèque des sciences et d'industrie**

Situated on the lower level of the immense cité des sciences et d'industrie in northeastern Paris, this Library is in two parts. The larger side is an open access public library specialising in science, technology and careers. It is very large with a substantial collection and many study places, good signage and effective traffic flows by means of a major staircase, escalators and axial corridors. Staff advised that they need to regulate behaviour of young men. The smaller, western side consists of a quiet study area mainly for postgraduate students and a multimedia centre with games equipment. Worth detailed study. <http://www.cite-sciences.fr>

46.



#### **Paris – Centre Pompidou – Beaubourg**

A landmark building in the ancient Marais quarter of Paris, the Pompidou Centre continues to operate very effectively, attracting large crowds to its library (<http://www.bpi.fr/fr/index.html>), exhibitions, films, multimedia, etc. Besides the well known architecture it is notable for the dramatic signage in its high entry foyer. [http://en.wikipedia.org/wiki/Centre\\_Georges\\_Pompidou](http://en.wikipedia.org/wiki/Centre_Georges_Pompidou)

47.



#### **Paris – Médiathèque Jean-Pierre Melville**

A beautiful médiathèque located in the 13 arrondissement, it opened in July 1989 and still looks extremely modern. It was designed by Daniel and Patrick Rubin (Atelier CANAL), and features an internal atrium which links the higher floors to the entry level by means of a glass enclosed staircase adjoin the front curtain glass wall. <http://bbf.enssib.fr/consulter/bbf-1996-05-0021-004>

48.



#### **Paris – Médiathèque Val d'Europe**

A stunning médiathèque located in a 'new town' next to Euro Disney 40 minutes east of Paris, the fresh modern architectural style contrasts with the faux-Haussmannian appearance of the surrounding apartments, hotel and shopping centre. Internally it makes good use of colour and has many excellent features including a theatrette and moveable shelving. Especially notable are the alabaster sunshades on the west facing windows.

[http://www.valeurope-san.fr/info/FR/Les\\_mediatheques/050202](http://www.valeurope-san.fr/info/FR/Les_mediatheques/050202)

49.



#### **Paris –Bibliothèque Marguerite Durand**

Named for a prominent French feminist, Marguerite Durand, this national women's library is located on an upper floor of the JP Melville médiathèque in Paris 13eme. It provides a pleasant space for consultation, looking out through the curtain glass wall of the médiathèque. <http://www.annuaire-au-feminin.net/eng/BMDURAND.html>



50.



### Reims – Bibliothèque Carnegie

A very fine example of a Carnegie Library, this Library was built as part of the reconstruction of Reims by US donors following its total destruction during WWI. Its beautiful art deco features have been lovingly restored and it is now the heritage library for the city of Reims. <http://www.bm-reims.fr>

51.



### Reims – Médiathèque Jean Falala

The plate glass windows of this startlingly modernist médiathèque reflect the reconstructed gothic architecture of the cathedral across the square. On three levels, it offers extraordinary spaces for consultation, contemplation and interaction. The open styled architecture is set off by well chosen furniture. <http://www.bm-reims.fr>

## Belgium

52.



### Antwerp – Bibliotheek Permeke

A new central public library in Antwerp was opened in 2005 in a disadvantaged area to promote **community engagement**. Staff report that it has been very successful and the users appeared to be very satisfied. Stramien & Planning Cell Antwerp converted the old unoccupied Permeke garage 'into a city library, a corporate **knowledge network**, a centre for **participation and integration** and a **meeting place**'. Great use of **natural light** from the industrial glass roof. The car ramp to the upper level has been converted into a **sweeping staircase** that bears workstations with a view over the lower reading room. Eye catching **signage** identifies different collection areas and **brightly coloured furniture** is offset against the 'industrial chic' of the design. Features include **mobile shelving** and **self check-in** with a **sorting system**. There is a separate study hall entered via glass doors. The galvanized sheeting exterior echoes the building's industrial heritage but is also durable and modern in appearance. In the forecourt between adjoining buildings there is a **glass box** which houses **training rooms** and a **café** but, curiously, it is not directly linked into the library.

<http://www.antwerpen.be/eCache/ABE/80/33/382.Y29udGV4dD04MDM3MDg3.html> ;

<http://www.architectuurfocus.be/default.aspx?ref=AEABAB&lang=EN>

## Netherlands

53.



### Amsterdam – Amsterdam Public Library

Amsterdam's new Central Library (Openbare Bibliotheek Amsterdam) is a high quality, 28,000 sqm six storey building located on an urban renewal site at the gateway to Amsterdam Harbour and close to the Central Station. Designed by Jo Coenen and opened 07-07-07, it is intended to be: "...a centre for information, for communication, for education, for culture and ... a meeting place for the community". It is designed to host 2.5 million visitors per year, on average 7,000 per day. It is open 84 hours per week (about the same as UTS Library) and features : 1375 seats in both large and small scale spaces; 600 seats with PCs/internet/MS Office; 270 seats in the Library Theatre; 6 Meeting Rooms (space for 25-75 participants); Restaurant; 2 reading cafes. Very high quality finishes, varied and interesting furniture, good signage.

[http://www.oba.nl/index.cfm/t/Facts\\_and\\_figures/vid/53CFB63C-DAA5-F06E-D7C6B196CB1D4AE4](http://www.oba.nl/index.cfm/t/Facts_and_figures/vid/53CFB63C-DAA5-F06E-D7C6B196CB1D4AE4);

[http://www.worldarchitecturenews.com/index.php?fuseaction=wanapln.projectview&upload\\_id=11852](http://www.worldarchitecturenews.com/index.php?fuseaction=wanapln.projectview&upload_id=11852);

<http://www.mimoo.eu/projects/Netherlands/Amsterdam/Public%20Library>

54.



### Delft – DOK Library Concept Centre

A very successful **reinvention of the idea of a public library** in a former supermarket building, public areas are on ground level and first floor with smaller second floor above for library offices. Original structure of columns and cut edges of slabs left exposed. Large glass roof over central staircase and open reading area provides lots of **natural light**. **Funky furniture** and **effective signage**. Winner of 'The Best Library in the Netherlands'. "DOK is on a mission to become **the world's most modern library**. In order to do this we believe we need to have the best communication with our users possible. Therefore we are working very hard on innovations. TANK U wants to be a place in town where people may download information on their mobile phone. Made available free of charge by their public library to inspire users with suggestions for reading, viewing or listening."

[http://www.dok.info/index.php?cat=pagina&pagina\\_id=110](http://www.dok.info/index.php?cat=pagina&pagina_id=110)

<http://www.infotoday.com/MLS/mar08/Boekesteijn.shtml>

<http://www.flickr.com/photos/shifted/sets/72157604142377648>

## Switzerland

55.



### Lausanne – Bibliothèque cantonale et universitaire de Lausanne

The Palais de Rumine in the centre of Lausanne formerly housed the University of Lausanne, the combined cantonal (public) and university library, and the museum. The University was relocated to a site along Lac Lemman in the 1980s but the building still houses a combined library which is a branch of the central library at the suburban campus and the civic museum. The Library is open to the general public and features cultural, music and regional collection for the canton of Vaud. It is a fine building which is most interesting for the contrast in **signage** between the original carved stone words and modern banners. <http://www.unil.ch/bcu/page18029.html>

## United Kingdom

56.



### Aberystwyth – National Library of Wales

Visited because of claims in the Designing Libraries Newsletter Issue 19: December 2009 that “the Visitor Experience Project ... [aimed] to provide a space which allowed the library to serve the needs of its current generation of users whilst preserving the beauty of the original reading room which was opened in 1916. ... The room now has a much brighter, airy feeling than before with new lighting making a significant contribution. ... Overall the refurbishment is a resounding success; a clever blend of old and new which recognises the different ways that people today use the library’s collections and services and integrates these seamlessly into the overall structure of the original building.” While the reading rooms are bright and pleasant, their facilities and fittings are quite conventional for contemporary libraries and the ‘visitor experience’ is compromised by an **unsuitable entrance** to the Library and strong **security** presence. <http://www.llgc.org.uk/index.php?id=2>

57.



### London – Croydon Library

Known as the “Croydon Clocktower” because the 1993 central public library building for the Borough of Croydon in South London was added at the rear of the 1930s Council building with a large atrium at the join, this is a pleasant, conventional public library. Its most interesting features are the collocation in the atrium of **two art galleries and a café**. The Library is on four levels with study spaces, reference, computers, local history and EU publications on the top level, non fiction and music below, fiction and career information below that and children’s library and service desks at the entry level. Reasonably heavy use at lunchtime on a Tuesday but quiet probably because there were two staff members at a desk on each level.

<http://www.croydon.gov.uk/leisure/libraries/croydonlibs/centrallib>

58.



### London – Idea Store Bow

Bow was the first Idea Store to be opened in May 2002, piloting the Idea service and philosophy. A pioneering initiative was the original Idea Store Strategy, approved in 1999, which has radically transformed the performance of library and information services in the London Borough of Tower Hamlets, moving them from being among the worst in London to among the top performing in the country. Idea Stores were designed to deliver ‘in a way that captured the best traditions of the library movement and education sector but present them in an **exciting** way – one that draws in new users and retains existing users.’ As well as the traditional library service, Idea Stores offer a wide range of adult education classes, along with other career support, training, meeting areas, cafes and arts and leisure pursuits – all brought together in easily accessible spaces which are modelled on retail environments. Idea Store Bow has delivered a major new leisure and learning facility for the area: adult education classes, library services, **events and a café**. The building is a redbrick addition to a 1930s red brick public library and offers a vibrant space with excellent **signage**.

[http://www.ideastore.co.uk/en/articles/libraries\\_your\\_local\\_idea\\_store\\_library\\_idea\\_store\\_bow](http://www.ideastore.co.uk/en/articles/libraries_your_local_idea_store_library_idea_store_bow)



59.



#### London – Idea Store Canary Wharf

Unlike the others, Idea Store Canary Wharf, which opened in March 2006, is not freestanding but is located in the lower level of a new office block. Its design and philosophy are similar to those of the others but it is smaller and oriented towards the needs of adults working in the offices in the urban renewal area at Canary Wharf. The **branding** and **signage** adopt the same distinctive style but the café is located outside the library, presumably for contractual reasons.

[http://www.ideastore.co.uk/en/articles/libraries\\_your\\_local\\_idea\\_store\\_library\\_idea\\_store\\_canary\\_wharf](http://www.ideastore.co.uk/en/articles/libraries_your_local_idea_store_library_idea_store_canary_wharf)

60.



#### London – Idea Store Chrisp Street

A free standing glass box adjoining a shopping centre, Idea Store Chrisp Street opened in July 2004. It bears the Idea Store **branding** with eye-catching blue and green glass and distinctive **signage**. Popular, its services engage the passersby and are convenient for the residents of the surrounding neighbourhoods.

[http://www.ideastore.co.uk/en/articles/libraries\\_your\\_local\\_idea\\_store\\_library\\_idea\\_store\\_chrisp\\_street](http://www.ideastore.co.uk/en/articles/libraries_your_local_idea_store_library_idea_store_chrisp_street)

61.



#### London – Idea Store Whitechapel

Also a free standing glass box opened September 2005, Idea Store Whitechapel is the borough's flagship library, learning and information service. It projects above the street market along Whitechapel Road, 80 m from the Whitechapel Underground Station. Marked by the distinctive green glass, the library provides a **vibrant series of spaces** over four floors for the predominantly South Asian community. At 11.30 am on a Monday it was very full of readers, computers users and attendees at adult education classes.

[http://www.ideastore.co.uk/en/articles/libraries\\_your\\_local\\_idea\\_store\\_library\\_idea\\_store\\_whitechapel](http://www.ideastore.co.uk/en/articles/libraries_your_local_idea_store_library_idea_store_whitechapel)

62.



#### London – London Library

Claimed to be the world's largest independent lending library, the London Library was established in 1841. It is open to all by subscription (UKP395 pa) and aims to provide 'the most direct and liberal access to knowledge'. The collection of some one million volumes is almost entirely open access and is **not weeded** except to remove exact duplicates, reflecting a central tenet of the Library that 'books are never entirely superseded, and therefore never redundant'. The Library has been extended several times into adjoining buildings and extensively refurbished recently.

<http://www.londonlibrary.co.uk>

63.



### London – Peckham Library

Opened in 2000, the award winning Peckham Library was designed by Alsop & Stormer and billed as “a **new kind of library**” but appears to be conventional in operation. It is located in South London and stands above the surrounding shops and houses as a striking inverted-L shaped 6 level building. The upper platform housing the public meeting rooms and the Library on floors 4 and 5 is supported by slender columns. Council offices, service desks and archives and local history are in the lower and smaller floors. The building is clad with oxidised copper sheeting making it a dramatic, modern **sculptural statement** with no relation to the surrounding terraces. Except for the lift lobby and toilets, floors 4 and 5 constitute a combined two level space with **three large pods** ‘floating’ in it. The pods are oval in shape and covered by pale plywood. The central one is reached by lift at floor 5 or by a circular staircase from the service desk in the middle of level 4. It provides a study space but has few power outlets and limited seating with some empty space. A reader commented that considerable noise comes up from floor 4 below. The other two pods house meeting rooms accessed from floor 5. It features excellent natural light and views over Southwark. “The building is **green** in more ways than one: the energy conservation strategy is commendable. The glass wall enables **natural light** to flood into the building, reducing the need for artificial lighting. The building is **naturally ventilated**, ... the windows ... open. That ‘tongue’ exists to provide shade for ventilation shafts, while a further benefit of the overhang is that in creating **shade**, it reduces the heating effect of bright sunlight on the south-facing front of the building. ... so much about this building says ‘**fun**’. This is as far removed as could be imagined from the traditional sterility and stuffiness which we might associate with a library. It stakes a clear and precise claim that learning is not necessarily boring - come on in and have a look” <http://www.bbc.co.uk/dna/h2g2/A1043164> ; [http://www.0lll.com/lud/pages/architecture/archgallery/alsop\\_peckham/index.htm](http://www.0lll.com/lud/pages/architecture/archgallery/alsop_peckham/index.htm) ; <http://www.galinsky.com/buildings/peckham/index.htm> ;

64.



### London – Wellcome Library

Part of Wellcome Collection, a £30 million public venue developed by the Wellcome Trust, the Wellcome Library is open to anyone seeking to understand medicine and its role in society, past and present. The Library is one of the world's major resources for the study of medical history with over 750 000 books and journals, an extensive range of manuscripts, archives and films, and more than 250 000 pictures as well as a growing collection of contemporary biomedical information resources relating to consumer health, popular science, biomedical ethics and the public understanding of science. The 1930s **reading room** has been elegantly refurbished and linked to new collection and reading areas providing a very effective **contrast in design** styles. <http://library.wellcome.ac.uk>

## Appendix B Other sites of interest visited

### France

65.



#### Arras – Musée de la cité nature

Designed by the renowned French architect, Jean Nouvel, this 'nature city' is located in a converted factory. It is an experiential museum in which visitors can interactively learn about natural systems including biology and agriculture. Exhibits include a 3x human body in fibreglass which children can climb over and through, 3D seed displays, a horticultural garden and a green wall (picture). <http://www.citenature.com/>

66.



#### Lille – Forum des sciences

A public science and technology centre in the northern industrial town of Lille, this is a dramatic building located in suburbs along the metro line to the university campus. Effective use of glass as a 'window onto science'. <http://www.forum-des-sciences.tm.fr/>

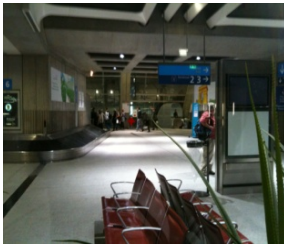
67.



#### Lyon – Monoprix, Rue Herriot

The central city Monoprix supermarket, this totally glazed building stands in contrast to its nineteenth century neighbours and reflects their images. It makes a dramatic statement without rejecting the streetscape of the Rue Herriot.

68.



#### Paris– Charles de Gaulle aéroport–Terminal

Built in a series of pods, Charles de Gaulle airport works very efficiently for travellers but can be confusing because of the circular nature of the buildings and walkways. It integrates with local, national and international trains. A fine example of planned visitor movement.

69.



#### Paris – Apple Store, Carrousel du Louvre

One of the new Apple Stores being constructed in major capitals, this concept store features the brand qualities of sparseness and clean design. The Genius Bar and solid glass treads on the open staircase signal that it is about experience rather than product. <http://www.apple.com/fr/retail/carrouseloulouvre/>

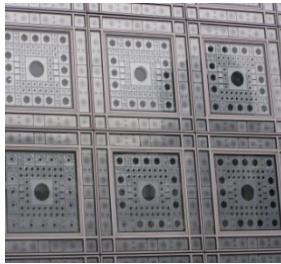
70.



### Paris – Gare de l'est

The 'eastern station' of Paris is a 19th century steel framed structure which has been brought into the 21st century by the addition of escalators, improved finishes and signage, and shopping facilities. It is no longer considered just a transport hub but also a place of 'experience'.

71.



### Paris – Institut du Monde Arabe

The 'institute of the Arab world' is a research institute, cultural centre and library on the left bank of the Seine. Externally it features foliated metal panels to convey the sense of Arabian tile work while providing sun shading.

72.



### Paris – Musée d'Orsay

The conversion of the terminus for the former Paris-Orleans rail line into a major gallery has created a soaring space under the steel framed glass roof. It is filled with light and a wonderful space in which to view sculptures although painting and drawing need to be displayed in the less illuminated side galleries.

73.



### Paris – Musée du quai Branly

The newest large museum in Paris, this shows Indigenous art from around the world. It is designed as an undulating gallery which is approached by a ramp with several pods suspended above. This makes interior navigation confusing. The layout of exhibits and small side galleries appears to be inflexible.

74.



### Paris – Virgin Mega Store, Carrousel du Louvre

The companion to the Apple Store in the new Louvre Shopping Hall, the Virgin Mega Store presents a contrast in business models. It offers a cornucopia of well presented product for the consumer rather than an emphasis on 'experience'.

75.



### Vienne – Musée gréco-romain

Poised above the extensive Roman ruins across the River Rhone from Vienne, this museum provides light, airy spaces with vistas over the archaeological site. A ramp provides access from the museum to the site.



## Belgium

76.



### Antwerp – Centraal Station

An extraordinary expansion of Antwerp's Central Station by layering three levels of tracks while preserving the 19<sup>th</sup> century station building and roof above. Has created a tremendous indoor space with views through the atrium to the various levels.

77.



### Antwerp – Stadsschouwburg (covered public space)

An enormous covered public space in front of the Antwerp theatre.

## Switzerland

78.



### Lausanne – Olympic Museum

Dramatically located at the side of Lac Léman in suburban Lausanne, the Olympic Museum is a modern concrete building designed around a central atrium. The **atrium** is used effectively to link the levels with galleries featuring the history of the modern Olympics, the Olympic sports and particular Olympics. There is a restaurant and a gift shop.

<http://www.olympic.org/en/content/Olympic-Museum>



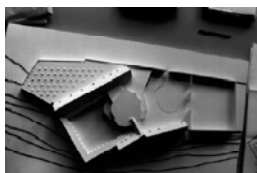


## Appendix C Other sites mentioned in the report

Libraries and sites not visited during the 2009 development leave but mentioned in the report are listed here. Most had been visited by the author previously; others were examined via web and/or publications as noted in the entries.

### Belgium

1.



**Leeuwen – KU Leeuwen** (examined via web and/or publications)  
“A new library for the exact sciences” constructed on the remains of a Celestine convent – see Dekeyser (2000) from which photo was copied.

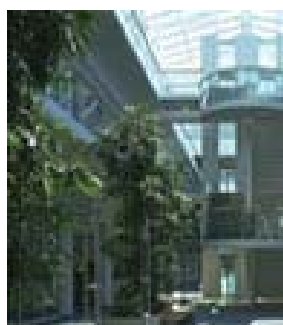
### UK

2.



**Bath – University of Bath – University Library** (examined via web and/or publications)  
Claimed to be “*building for the twenty-first century*”, it aims to integrate the delivery of IT and multi-media information services with the more traditional library services of books, reading and study space. The Structural Steel Design Award Scheme for 1997 was given for ‘an elegant conception solution had been worked out with technical innovation and flair’. “A new learning centre was created at the front of the Library, and at the same time the whole of the former building was refurbished. With over a thousand seats, including 450 computer workstations, it was purpose designed for 24 hour opening. The University’s 500,000 volumes of books and periodicals are, in this **library for the future**, provided within an environment conducive to the growth of self-directed learning and group work. The facility is intended to encourage the development of IT skills and computer assisted learning, whilst maintaining the social role of the library at the academic heart of the University. The University of Bath has a proud reputation of providing graduands with skills for the modern world of management and industry; its mission is to advance learning and knowledge by teaching and research, particularly in science and technology, in close association with industry and commerce. The opening of the new Library is a manifestation of its commitment to this mission.” Photo from website <http://www.bath.ac.uk/library/about/building.html>

3.



**HP Labs Bristol** (examined via web and/or publications)  
A new, purpose-built headquarters opened in January 1998 and was recently named one of the most visually **exciting**, functionally **efficient** and **technically advanced** company buildings in the UK. The centrepiece of the building is a three-level glass atrium. The open **atrium** area, known inside the lab as “the Street,” promotes a comfortable working atmosphere and communication between groups. A glass roof provides plenty of **natural light**, while displacement air conditioning ensures the best air quality. In the middle of the ground floor is the **café**, one of the key areas of the building. Photo from website <http://www.hpl.hp.com/bristol/environment.html>

4.



#### **London - British Library (visited previously)**

The British Library removed from the British Museum to the St Pancras site some 20 years ago. The building operates very well and internally manages to be both grand and have human scale spaces. Opening the Library to the general public, including students, was controversial but has made it a major destination in London. It hosts many cultural events, exhibitions, film screenings, etc. The Innovation Centre is a key to engaging with the business community by providing free assistance to start-ups. A large proportion of the collections are held elsewhere, principally at Boston Spa in Yorkshire.

